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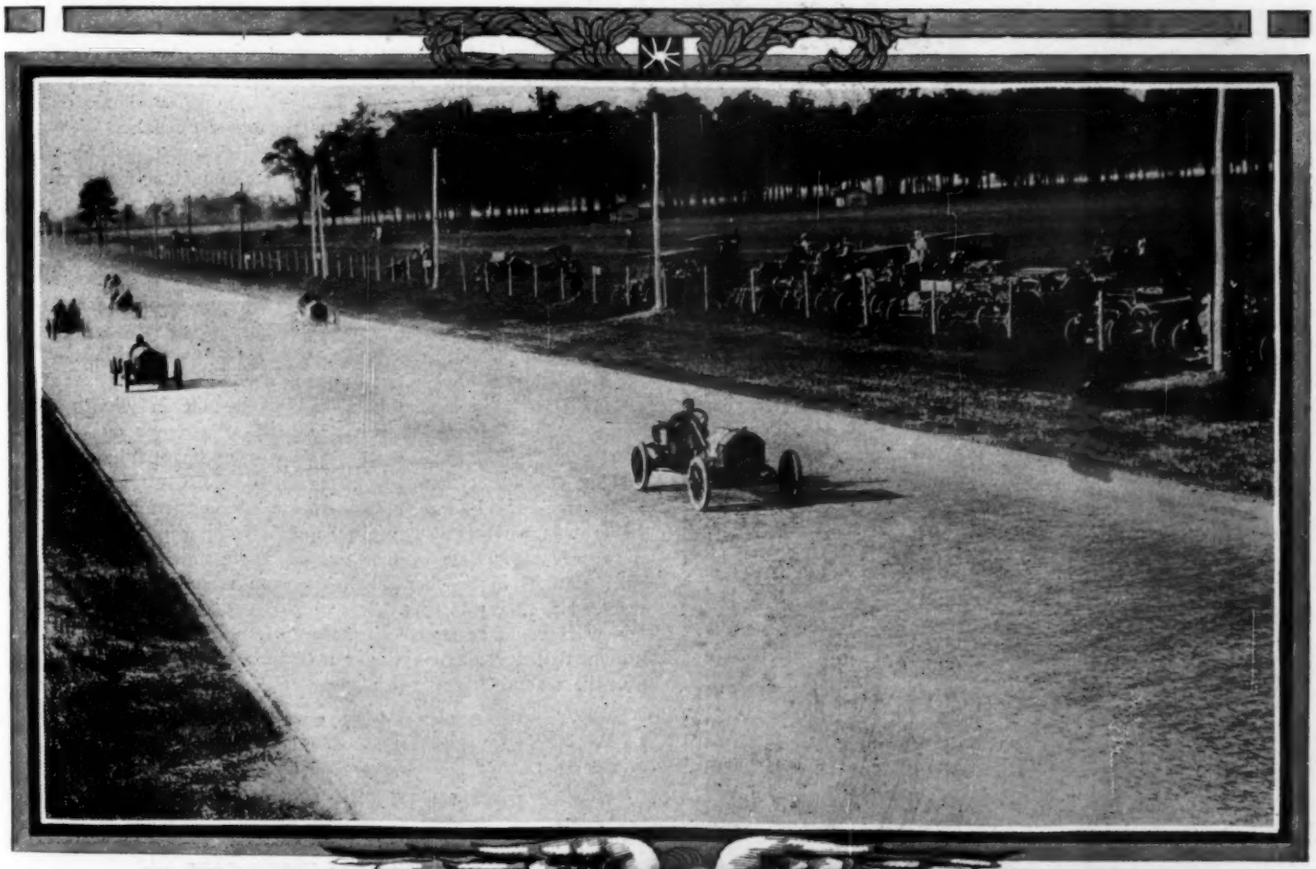
THE AUTOMOBILE

Records Fall at Indianapolis—W. & S. Cup to Marmon



On the Straightaway at the Indianapolis Speedway

INDIANAPOLIS, May 31.—The three-day racing carnival on the newly-surfaced motor speedway was brought to a conclusion yesterday afternoon, when probably the largest crowd that ever attended a similar event in this country watched the sport. Fully 60,000 spectators sat out the interesting programme. The feature of the carnival was the 200-mile event for the Wheeler & Schebler trophy for Class E cars, of 600 cubic inches piston displacement or less, and of a minimum weight of 2,300 pounds. Ray Harroun, driving a Marmon Six, was the winner; Lynch, Jackson, second; Aitken, National 40, third; A. Chevrolet, Buick 16B, fourth.

Making the Hurdle

Records went by the board all along the line. Kincaid, National, took 24.88 seconds off the 100-mile record of 1:24:08, made by Chevrolet at Atlanta. Aitken's (National) 8:08:36, made in the 10-mile event for 301-450 cubic-inch cars, was 9.16 seconds better than Chevrolet's best previous. Kincaid (National) lowered the 301-450 5-mile figures by 40 seconds, and Chevrolet, himself, took a hand in the general onslaught, the big fellow sending his Buick over the line 49.10 seconds better than the record in the Class B 160-230 10-mile race on the last day. National, Knox and Marmon each won two championships.

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Fig. 1—Rankin in Chalmers having a say
Fig. 2—National doing its expected work
Fig. 3—Mullins in Buick free-for-all
Fig. 4—Correja car driven by Taylor

Bridgeport Hill Climb

BRIDGEPORT, CONN., May 30—While hundreds of people lined the winding ascent of Snake Hill, Fairfield, Conn., the hill climb of the Bridgeport Automobile Dealer's Association was held this morning. Notwithstanding the injunction brought against the association by Frederick Sturges, New York millionaire, the climb was successful in every sense of the word. Although the steep hill was well soaked with the early morning rain the cars made good time. "Billy" Knipper, piloting a Chalmers, made the best time of the day, covering the seven-tenths mile course in one minute and eight seconds. Sixty members of the Coast Artillery guarded the course and no accidents marred the contest, although many narrow escapes occurred at "Deadman's Curve," which was the most perilous of the course. Dean Rankin in a Chalmers took the curves very fast, it was said, but lost time on the steep grades. Thomas H. MacDonald, of the Automobile Club of Bridgeport, acted as referee, while C. H. Gillette, president of the Automobile Club of Hartford, was the A. A. A. representative. Members of the Automobile Club, including F. T. Staples, F. W. Blolande, F. A. Rantz and R. M. Sperry, acted as the other officials.

The climb started promptly at nine o'clock with Events Nos. 1, 6 and 7 scratched on account of not filling, leaving seven to be contested. The first car over the finish line in the $851-$1,250 event was a Warren-Detroit, driven by J. H. Brooks which covered the course in 1:59.

A Correja, driven by J. Taylor, won the $1,251 to $1,600 event in 1:41; H. P. Hardesty's Pullman finishing second in 1:48 1-5.

The event for $1,601 to $2,000 stock cars was easily won by a Pullman driven by J. J. Schenck, in 1:34 4-5; the Stoddard-Dayton driven by H. B. Griffin, finishing second in 2:06.

Dean Rankin in a Chalmers had no trouble in winning the $2,001 to $3,000 stock car event in 1:18. He drove one of the finest races of the day, and took the curves beautifully without slowing down.

The free-for-all furnished the real excitement of the day, and the crowds went frantic when "Billy" Knipper piloted a Chalmers over the course in 1:08 3-4, making a new record for the hill. Rankin in another Chalmers won second honors in the event. His time was 1:15.

New Haven men won both motorcycle events, G. A. Wildman, Indian, that for single-cylinder machines in 1:26 1-5, and P. H. Cox the second in 1:13 1-5, also on an Indian. The summary:

$851 TO $1,250 STOCK CARS

No. Car	Driver	Time
1—Warren-Detroit	J. H. Brooks	1:59

$1,251 TO $1,600 STOCK CARS

1—Correja	J. Taylor	1:41
2—Pullman	H. P. Hardesty	1:48 1-5

$1,601 TO $2,000 STOCK CARS

1—Pullman	J. J. Schenck	1:34 4-5
2—Stoddard-Dayton	H. B. Griffin	2:06

$2,001 to $3,000 STOCK CARS

1—Chalmers	Dean Rankin	1:18

FREE-FOR-ALL

1—Chalmers	"Billy" Knipper	1:08 3-4
2—Chalmers	Dean Rankin	1:15
3—Correja	J. Taylor	1:34 4-5
4—Buick	J. McMullin	1:36

Harbach Asks Recognition

Secretary Harry C. Harbach, the wide-awake official of the Quaker City Motor Club, has entered a protest against the use of the "secret time schedule" devised by him for the roadability runs of the Quaker City Motor Club by other clubs and organizations unless due credit is given his club. Mr. Harbach suggests that promoters planning runs under a secret time schedule insert a line in the captions of their literature according credit.

Sheridan Hill Climb

BUFFALO, N. Y., May 29—With the low and winning score, a small-powered Ford touring car finished first in the hill-climbing contest held on Sheridan Hill, near Forestville, under the auspices of the Dunkirk (N. Y.) *Observer*, yesterday afternoon. A Marion Roadster of 35 horsepower was second, while a Buick surrey, 18 horsepower, was third. Behind these placed cars ten others finished, many of them possessing more engine power than the winners.

Such a result was made possible by an original and ingenious plan of handicapping, which was devised by E. D. H. Caldwell, chief engineer of the Chautauqua Motor Company, and approved by Dr. A. Wilson Dods, H. J. Thompson and other officials of the contest.

The plan in brief was as follows:

The cylinder volume of each contesting car was multiplied by the number of seconds required to make the run up the hill in a first contest; then, from that was subtracted the total points gained by the same car in a second contest, the hill being divided into sections, so that a car was awarded 500 points for covering the first 500 feet, on high gear, three points for each foot in the second section, five points for each foot in the third section, eight points for each foot in tne fourth, ten for each foot in the fifth and 25 points for each of the remaining ten feet at the top of the hill. The car which, at the end of the two contests, by subtracting the points gained in the second contest from those awarded in the first, had the smallest score was the winner and was awarded the cup for first prize.

The contest was unlike the usual hill climb, by reason of the fact that the smaller cars, instead of being placed at a disadvantage, had if anything, a little the better of the argument. Some slight alterations in the plan might make it a fair basis upon which similar contests may be held in future.

The contest was up the steep Sheridan Hill, just outside of Forestville, N. Y., a hill which is conceded by motorists to be one of the most difficult to ascend in this part of the country. The hill is about half a mile long and at different points the angle of its rise is said to be greater than 45 degrees. The contest was limited to gasoline motor cars that were either sold by agents or owned in northern Chautauqua County, N. Y., all of the cars being required to be equipped ready for road use with the exception that the tops and the glass fronts, usually carried, were allowed to be removed.

Under the original plan the contest was to have been conducted last Thursday, but owing to the treacherous condition of the hill, because of the heavy rains during the early part of the week, the event had been postponed until yesterday. There had been 22 original entrants for the contest, but of the number only thirteen actually competed, some cars being withdrawn previous to the day and others because of minor derangements which would have delayed the event had time been taken to make the necessary small repairs.

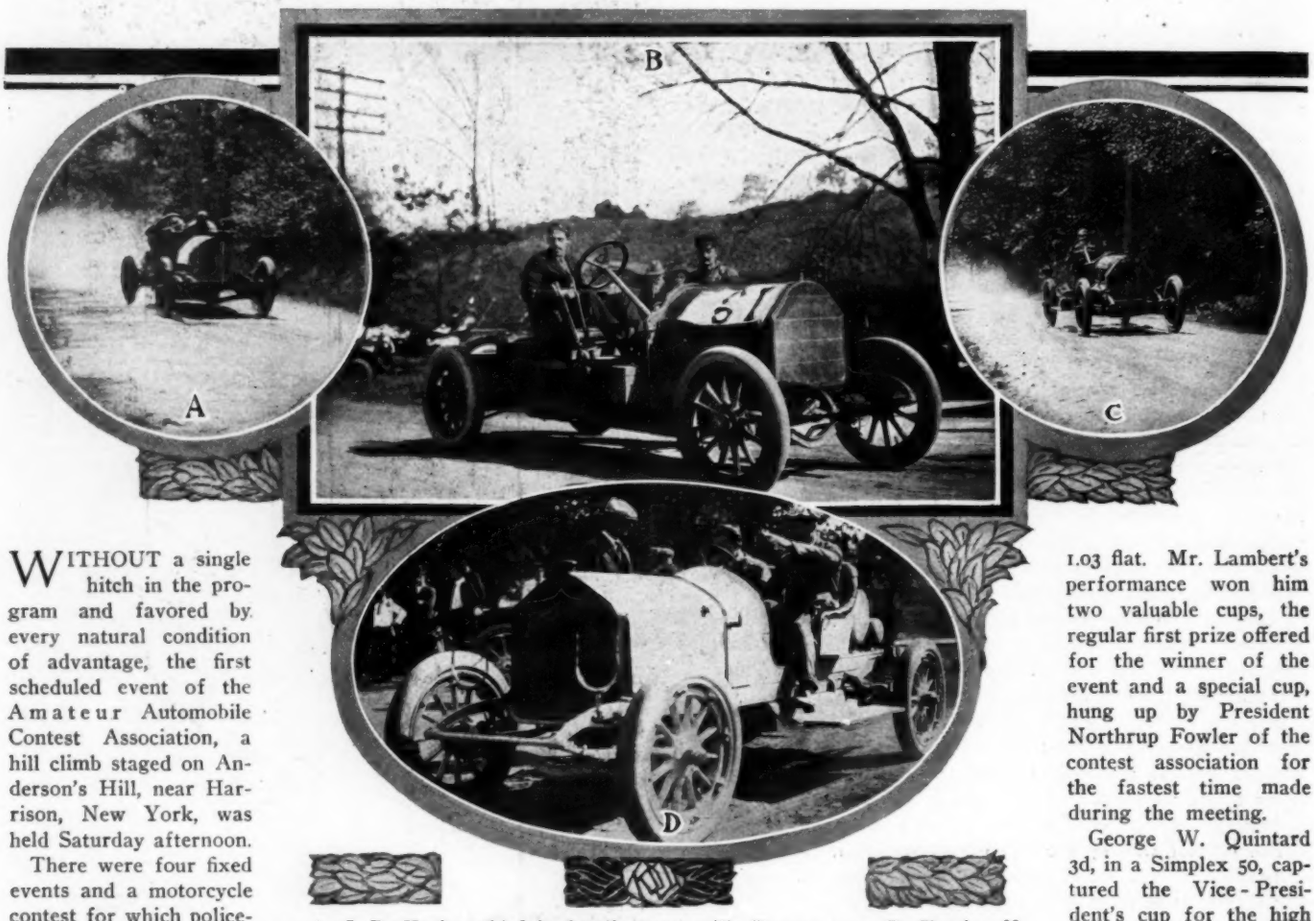
An added feature of the afternoon's sport was an exhibition of climbing the hill by James C. Barclay, of Buffalo, in his Model K, 70-horsepower, Thomas racer. This feature had no bearing on the actual contest, but was given to demonstrate the ability of Mr. Barclay's car, which was recently built for him by the E. R. Thomas Motor Car Company. The racer went up the hill without any difficulty in 55 seconds, which was more than ten seconds better than the fastest performance of any car in the actual contest.

The officials of the contest were: Judges, H. J. Thompson, Dr. A. Wilson Dods, Walter Record, F. R. Wilson, P. F. Valentine, E. D. H. Caldwell, Dr. M. S. Coxe; Starter, G. B. Williams, editor of the Dunkirk *Observer;* Timers, Dr. A. Wilson Dods and E. D. H. Caldwell; Clerk of Course, G. E. Frey. The tabulated result of the contest follows:

(*Continued on page* 1026.)

Fig. 1—Just before the start
Fig. 2—Looking at Sheridan Hill
Fig. 3—Buick No 17 doing high gear work
Fig. 4—Ford Model T distinguished itself

Amateurs' Hill Climb Held in Westchester



A—J. D. Hooker third in fourth event with Stearns car. B—Simplex 90 driven by G. B. Lambert, who took away the record. C—Speedwell driven by H. A. Weatherbee. D—National driven by L. M. Rutherford, which made excellent time and performed excitingly.

WITHOUT a single hitch in the program and favored by every natural condition of advantage, the first scheduled event of the Amateur Automobile Contest Association, a hill climb staged on Anderson's Hill, near Harrison, New York, was held Saturday afternoon.

There were four fixed events and a motorcycle contest for which policemen in that branch of the service were eligible to enter. Aside from the four officers who took part in that event, the participants in the racing were all wealthy young men who drove their own cars.

The scene of the contest is a beautiful spot about two and a half miles from White Plains. The course was laid out over a splendid roadway, exactly a measured mile. The start was on a straight, level bit of ground about 300 yards long where it swerved to the right and climbed a long hill whose stiffest grade was 11.25 per cent. The average grade of the whole mile was 5.81 per cent. At the top of the hill there was another swerve to the right and, passing a series of reviewing stands, the contestants dropped down a short, sharp grade to the finishing line.

The course led past the Oliver Harriman and Whitelaw Reid estates, and in the crowds of spectators were many persons of national importance and prominence.

The motorcycle race was decided first, and of the thirteen original entries, four accepted the issue. The winner turned up in Patrolman Ruggiero, of the Scarsdale force, who drove an Indian machine across the line in 1.07 1-5. Officer Ball, of Rye, came second with another Indian in 1.16 2-5. In addition to the medal and purse offered by the association for the winner of this race, George W. Quintard 3d, presented a beautiful medal.

The other races were strictly for amateurs and all of them proved to be stirring contests.

The fastest time made during the afternoon was by G. B. Lambert in his Simplex 90, who won the free-for-all event in 1.03 flat. Mr. Lambert's performance won him two valuable cups, the regular first prize offered for the winner of the event and a special cup, hung up by President Northrup Fowler of the contest association for the fastest time made during the meeting.

George W. Quintard 3d, in a Simplex 50, captured the Vice-President's cup for the high average made in two or more trials. This trophy was given by Richard M. Jesup. In addition to that prize, Mr. Quintard was second in event No. 3 for Class C, Subdivision 5, cars, with piston displacement of from 451 to 600 cubic inches.

The Class Cup, presented by C. A. Fowler, Jr., for the fastest time made in Classes 1, 2, 3, 4 and 5, was taken by S. E. Wishart in a Mercedes, who won the preceding race in 1.05 flat.

The "Git a Horse" cup, presented by J. G. Wilson for the slowest time made by any car in the racing, was won by Mr. Wilson himself, in his Lancia car in 1.44 1-5 in the free-for-all.

The officials of the meeting were as follows:

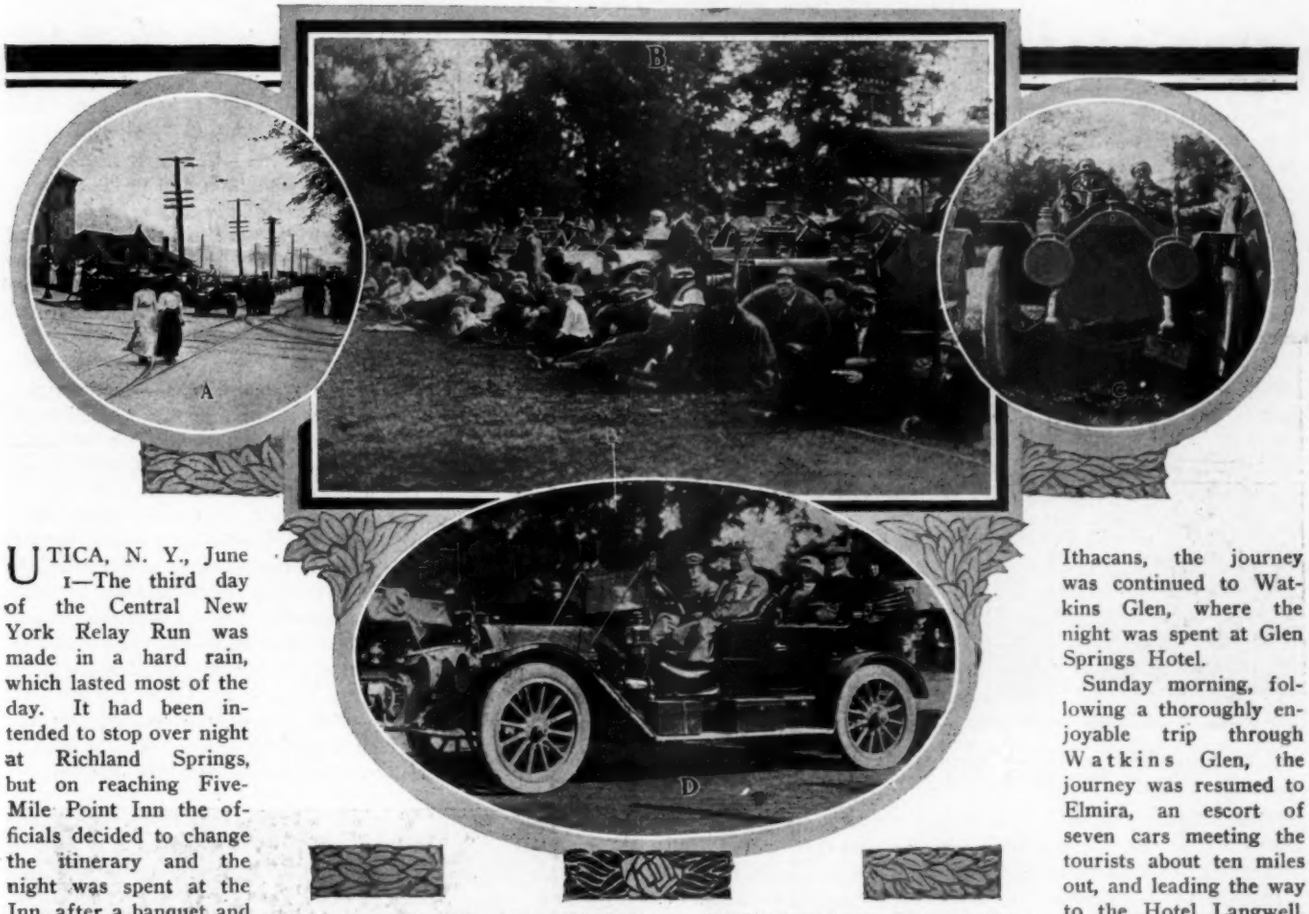
Referee, W. A. Whiting; Judges, William Bruce Brown, Robert L. Chamberlain, Claude D. Sterling, Charles D. Lanier, Bradford Ellsworth, Edwin N. Chapman, Robert McC. Butt, William W. Heaton, Louis P. Fish; Starter, John D. Chapman; Clerk of the Course, Edwin Moore; Scorers, Reginald M. Johnson and Chauncey B. Griffen; Timers, The New York Timers' Club; Technical Committee, A. L. McMurtry, Chairman.

The officers of the association are as follows: President, Northrup Fowler; Vice-presidents, Richard M. Jesup, Henry H. Law and John M. Rutherford; Secretary and Treasurer, J. Gilbert Wilson; Board of Directors, C. M. Chauncey, C. A. Fowler, Jr., Northrup Fowler, R. M. Jesup, H. H. Law, J. M. Rutherford, J. Thompson, J. D. Tooker and J. G. Wilson.

The event was one of the most interesting of the season thus far, and that it will be repeated is to be hoped at least. The participants all agree that the good of the industry was well cared for.

(*Continued on page* 1026.)

Central New York Run Was a Pleasant Jaunt



A—Cars Checking in at Binghamton. B—Whiling Away Time at the Ithaca Game. C—Messrs. Ritchie and DeWitt in car; Commissioner Lyon standing. D—Official Thomas Car; Commissioner Lyon in front and William Pierrepont White at the rear.

UTICA, N. Y., June 1—The third day of the Central New York Relay Run was made in a hard rain, which lasted most of the day. It had been intended to stop over night at Richland Springs, but on reaching Five-Mile Point Inn the officials decided to change the itinerary and the night was spent at the Inn, after a banquet and dance. At Oneonta a luncheon was provided by the local club.

The third day brought out the first accident of the run. In coming around the turn in Oneonta from the country road onto the paved main street, an Oakland 24, driven by T. F. Willis, skidded forward into the curb on the opposite side of the street. The right front wheel was bent clear around and under the car till its diameter was parallel with the street. In this position the car swung clear around and across to the opposite curbing. Apart from the bent axle there was no damage done, Willis and his companion holding their seats and alighting unhurt. The axle was taken off, bent straight and the car continued the run in good shape.

The run here this morning found the roads in splendid shape. Even the hard rains have not spoiled the pleasure of the tour. This afternoon Rome and Oneida will be visited, and the run will finish in Syracuse this evening, where a Dutch lunch will be served. Fourteen cars started from Syracuse Saturday morning over roads which, as a result of almost continuous rains the preceding week, were in anything but first-class shape. Additions made to the list of entrants at Auburn and Cortland brought the number up to an even score. Unfortunately an escort of twenty cars sent out to meet the travelers and show the way through Cortland failed to make connections through some misunderstanding of road orders. At Ithaca the local motorists turned out in force and escorted the travelers to the Dutch Inn, where a tasty luncheon was set out, following which the entire party took in the Cornell-Michigan baseball game, the cars being parked along the left field foul line. After the game, still under the escort of the Ithacans, the journey was continued to Watkins Glen, where the night was spent at Glen Springs Hotel.

Sunday morning, following a thoroughly enjoyable trip through Watkins Glen, the journey was resumed to Elmira, an escort of seven cars meeting the tourists about ten miles out, and leading the way to the Hotel Langwell, where dinner was served. In the afternoon the route was taken for Binghamton. At Owego fully a hundred cars were found drawn up along the road waiting to escort the tourists to the night stop. Binghamton fairly outdid itself in welcoming and entertaining the visitors. At dinner J. E. P. Clark acted as toastmaster, and among those who responded to toasts were William Pierrepont White, the "Father of Good Roads" in New York State; Frank T. Lyon, of the State Highway Commission, and J. Arthur Ritchie. Letters were read from S. Percy Hooker, Commissioner of Highways of New York State; Lewis E. Speare, president of the A. A. A., and Frank G. Webb, president of the State Association.

As a demonstration of the perfection already attained in good roads works in Central New York the run is an undoubted success. Barring the first day, when the roads were heavy in many places as a result of the continuous rains, the route selected has been over a literal boulevard—beautiful macadam and hard-rolled earth roads throughout. The promoters considered also the scenery in laying out their itinerary, and the route taken has included many of the beauty spots in the central section of the Empire State. Add to this the stimulating effect upon automobilists generally in the cause of good roads and fair laws, and it may be gathered that this unique outing has exceeded the most sanguine expectations of its promoters.

Fully 200 cars participated in the run during the first three days, dropping in and out at will, and this fact alone seems to demonstrate that cross-country tours, properly managed and conducted under rules, eliminate uncertainties.

Twenty Cars in Washington Post Run

STAUNTON, VA., May 27—At the conclusion of the first day's run of the Washington *Post's* touring test run from Washington to Richmond and return, it was found that 10 of the 20 cars participating had perfect road and mechanical scores. Although the first 55 miles of the route furnished about as rough and rocky going as could be found anywhere, there is no finer route in this country than that found in the Shenandoah Valley, excellent roads and beautiful scenery combining to make it a favorite touring ground.

The contest is being run under Grade 3, rules of the American Automobile Association, which provide for road and

Fig. 1—Contestants having their photograph taken in front of the Washington Post building

mechanical penalties, but eliminate the outdoor tests at the conclusion of the run. The following are the cars that started, with the names of the drivers:

Division 1A—Hupmobile, I. C. Hamilton, driver; Maxwell, A. D. Reh; Paige-Detroit, E. Selby.
Division 2A—Ford, C. E. Miller; Buick, Stanley Mortimer; Ford, E. J. Drake.
Division 3A—Regal, Frank Hosmer; Overland, Clayton Graff; Moline, E. H. Wine; Maxwell, Harry Walls.
Division 4A—Washington, Frank Carter; Washington, W. D. Arrison; Marion, Herbert M. Hall; Buick, "Ted" Johnson.
Division 5A—Oldsmobile, Taylor Pollock; Mora, John J. Fister; Columbia, Bert Robertson; Elmore, Frank Hardart, Jr.
Division 6A—Amplex, Robert Reed.
Division H—Buick truck, Ward Angle.

Most of the small towns situated on the valley pike have strict laws limiting the speed of motor cars passing through them to 6 miles an hour. In every instance but one this law was suspended for the day. The one exception was Mount Crawford. Word had been sent ahead that this hamlet had a speed trap in operation and that preparations had been made for a great haul when the tourists passed through. The timely warning was

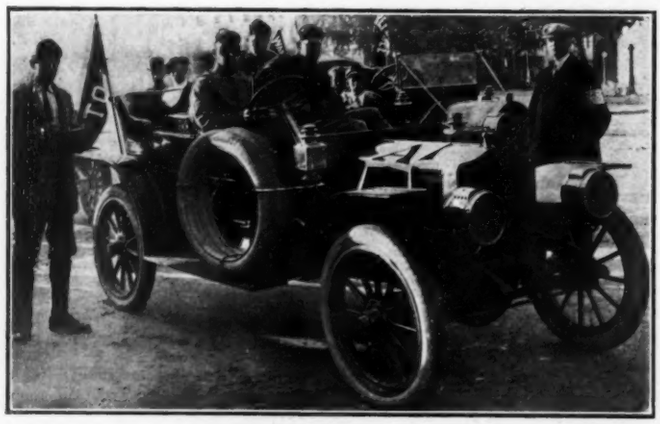


Fig. 2—Harry Duckstein, Automobile Editor of the "Post" and Maxwell car

heeded, and when the village was reached each car passed through at a snail's pace.

The Regal was the first car to sustain an accident. About 30 miles out of Washington a nut was sheared off the differential, necessitating the boring out of a bolt. This was an all-day job, and when it was finally completed it was nearly dark. The driver made up his mind to reach Staunton and drove all night to do it. The car sustained a penalty of 760 points for being late into Staunton, but its mechanical score has not been determined.

The Elmore entered by Frank Hardart, winner of the Munsey sweepstakes trophy last fall, and driven by his son, had ignition troubles and withdrew from the contest. The car will continue in the tour, however, as a non-contestant.

The Hupmobile has a perfect road score, but lost a point for stalling the motor, 3 points for replenishing the water supply and 6 points for work on the gasoline pipe. For stalling the motor 1 point was marked against the Marion. The Mora lost 3 points for an adjustment of the motor. One of the Ford entries lost a point for tightening one of the lamps and 2 points for stalling the motor. Five points for an adjustment to the carbureter and 6 points for motor stops was the penalty laid against the Paige-Detroit. One of the Buick entries lost a point for work on the hood, while a Buick truck lost 38 points, 31 of which were for being late in the noon control, 3 points for replenishing the fuel and 4 points for work on the car. The Amplex has a perfect mechanical score, but lost a point for being late leaving the noon control.

RICHMOND, VA., May 29—One-half of the touring test run was completed when the contestants checked in here last evening after a strenuous trip from Staunton. The route was through

Fig. 3—Just started, the run is taking departure from in front of the Washington "Post"

Rock Fish Gap, one of the hardest roads to negotiate to be found in seven States. A new road is being cut through the gap and is only half completed, but this was the route selected and the tourists had to take it. When completed this will be an excellent road and the private citizens who have contributed money to build it are to be congratulated on their public-spiritedness.

WASHINGTON, D. C., May 31—The finish of the *Post* touring test run found the Overland eliminated from the perfect score class by reason of loose spring clips, a penalty of 25 points being inflicted. The Marion lost a point for a motor stop. The Buick truck lost more points yesterday, a total of 111 being marked against it. For stalling the motor another point was placed against Paige-Detroit. The technical committee last night gave the Regal a total of 1,145 points for its first day's troubles, and also placed Maxwell runabout back in clean score class by lopping off the 2 points penalty imposed on the second day for work on the oil regulator. The 1 point marked against the Buick the first day for work on top of the hood was also lifted. The run was a great success.

Automatic Stability in Aeroplanes

ADAPTED FROM THE GERMAN OF R. CONRAD BY MARIUS G. KRARUP.

MEANS for imparting automatic stability to aeroplane machines are considered in a series of articles in *Der Motorwagen* by the editor of this publication, the civil engineer Robert Conrad. He shows by a large number of photographic reproductions the many different ways in which aeroplane machines have lost their balance in the air and have been precipitated to earth, now in one position and now in another. An extract of the reasoning which he offers on the subject of the available mechanical expedients for avoiding similar downfalls in the future is presented in the following:

By automatic stability is sometimes understood the stability resulting from the relative positions given to the various immobile surfaces and weights. The automatic stabilizers here to be considered are something different, viz., apparatus which, by operating control surfaces, automatically rights the aeroplane when it threatens to upset, either laterally or longitudinally. The following stabilizers may be mentioned: pendulums, klinographs, feeler-areas and gyroscopes, the latter acting either on control surfaces or direct on the main planes.

The pendulum principle is most logical when the weight of passengers and motor is used as the pendulum weight. A heavy weight is necessary in order to have it operate front or rear tilters, ailerons or a main-plane warping-device. Light pendulums could be used only as a means for releasing a more powerful apparatus and making its forces operate in the right direction. A diagram indicating how the pendulum might be used for adjusting ailerons is shown in Fig. 1A.

At a turning movement of the machine the pendulum acts, of course, unfavorably, and it has been tried to lock the pendulum during a turn by pedals arranged for this purpose. A drawback to the pendulum plan is that sudden gusts which affect the whole machine and merely push it sideways in the atmosphere, parallel with itself, also make the pendulum swing. This would be a source of danger. To use the pendulum for correcting the longitudinal balance seems very difficult, as any ordinary pendulum reacts for accelerations and retardations the same as for changes of poise. Every retarding wind would cause the pendulum to swing forward, producing the same control action as if the front of the machine had dipped, consequently retarding the machine still more and producing an exaggerated rising effect, since the contrary wind in itself has a tendency to make the machine rise. On the other hand, under the influence of a gust of wind from behind, the pendulum would have the effect of helping to produce a headlong fall. Fig. 1B illustrates these shortcomings of pendulum control, the upper diagram showing the action in case of a sudden increase of headwind resistance, and the lower one the same pendulum action, but due to a forward dip of the machine. In both cases the pendulum is assumed to operate the tilt rudder.

In other words, the free pendulum acting on control apparatus, is not in itself a good automatic balancer. A mechanism is conceivable, however, by which the pendulum would no longer act the same way for changes of inclination as for changes in speed. The pendulum could be suspended free to swing in a circle and connected with a horizontal pendulum. In that case, the angle of the pendulum with the vertical would not be changed, or very little changed, by accelerations of the machine.

But from all points of view the pendulum leads to complications, unless it is merely employed to indicate in what manner the control apparatus shall be operated.

To indicate the many possibilities which exist theoretically for automatic balancing apparatus, the klinograph or angle indicator may be mentioned. It would be possible to arrange a disk on a horizontal axle and protected against the wind with so little frictional resistance that it would remain stationary, whatever the change in the position in the air of the whole machine, and it would therefore show directly any deviation in angle from the previous direction of the latter. The problem of translating into control movements the relative changes between the axle of the disk and its frame by means of electrical, frictionless contacts, may be a difficult, but future solution.

Still farther in the future lies the employment of what might be called sense organs for the flying machine, meaning thereby light and mobile surfaces, so arranged that if one of a pair is affected by the wind its movement—or the differential movement of the two feeler-planes—is communicated to a control apparatus, not so as to operate this control apparatus, but so as to indicate at a very early moment of the disturbance in what manner the control apparatus should be operated. By means of a compressed-air device, steam or other intermediating element of releasable power, a very slight difference in the pressures communicated from two feeler-areas could readily be made to actuate a counter movement of the real control areas almost before the machine as a whole had felt the effect of the gust of wind or other disturbing factor against which the feeler-organs reacted. The flexible uprights in the Wright tilt-rudder may indicate a conception of this nature on the part of the Wrights, though probably only in a subconscious state.

The gyroscope is probably the best but also the most expensive stabilizing device for the present stage of the development. As heavy and complicated as in the Scherl-Brennan monorail car it would not be applicable to flying machines, but such a heavy and complicated apparatus is also not required for the work to be done.

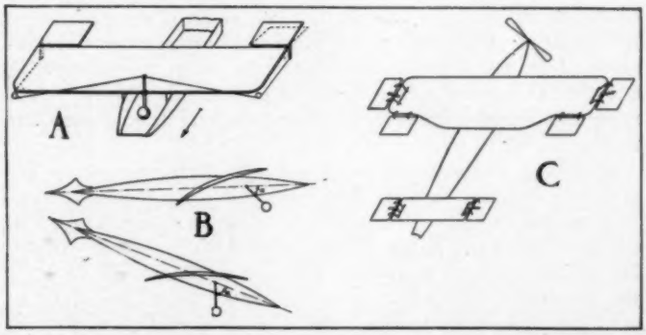


Fig. 1—A, automatic control of ailerons by pendulum. B, pendulum reacts for retardation, upper diagram the same as for pitching, lower diagram. C, feeler-areas, spring-attached, easily deflected, a possibility of the future.

The rotating Gnome motor is considered such a gyroscope, and Farman claims that he can detect the righting effect of this motor very plainly, but the true merit of this type of motor is probably much more the flywheel action of the cylinders, by which stalling of the motor from poor carburetion or faulty ignition is obviated, the momentum giving the motor a chance to recover. In the Gnome motor the weights are also not peripherally located, nor is the speed very high. It would be possible to obtain a 16 times higher gyroscopic effect with a much smaller weight rotated at a four times higher speed, if it were desirable to employ gyroscopic action of such force. But it is preferable to get along with much smaller weights and forces. It might be considered to place the axle of the gyroscope vertically, so as to avoid resistance against side-steering, but the vertical position of the shaft would oppose the natural canting of the machine in the curve, and an oblique ascent or descent would also be hindered.

(To be continued.)

How About Starting on the Spark?

AUTOISTS, when they are wont to represent, in the most convincing way, the excellence of their respective makes of automobiles, use as one argument the fact, as they say, "it will start on the spark every time." The real question is, will it? If not, what is the percentage of the total number of times that the average automobile will start on the spark? If it will start in this way, with great reliability, then, let us take up the question of the desirability of doing so. Salesmen, considering the class who rely upon "selling points" for their results, will be glad to have every prospective purchaser believe that starting on the spark is only possible every time with the particular automobile they are interested in, but will it?

Just how much of a twist the crankshaft will receive when the start is made by the spark from a dead standstill, is a matter that can not be disposed of in the abstract. It depends upon the weight of the flywheel, radius of the rim of the same, and such considerations. Fortunately, single cylinder motors, with their large flywheels, cannot be made to start from the spark. It is highly improbable that the crankshaft of the average single cylinder motor would survive the shock for long.

Some Expressions of Opinions From Autoists

The following are expressions of opinion from autoists, who, in protest of an answer which was made to a letter of inquiry in relation to this question of starting on the spark, offer the evidence of experience to show that starting on the spark is not only perfectly feasible, but a very regular proceeding:

(A) "In regard to your letter number 2201 entitled 'Starting on the Spark,' your reply says that you doubt if the experiment spoken of, in which the spark plugs and other parts were removed from the cylinder, leaving them open to the atmosphere, and that then after replacement the engine was started on the remaining mixture, on the spark ever happened, or could be made to happen.

"For your information I would say that, after running my engine one day last summer and having a skip, I removed my four magneto plugs. I cleaned these plugs, adjusted the points, put the plugs back, threw on the spark and my engine started. My brother went me one better. He has the same kind of a car and removed both his battery and magneto plugs, cleaned them, put them back, threw on his spark and his engine started.

"Both of us will be willing to swear to the above statements before a Notary Public.

"Your answer to letter No. 2201 would lead people to believe that it was necessary to have gasoline under compression to get an explosion, but the general public know from items in the daily papers that gasoline often explodes when it is not under compression. I wish you would state these facts in your 'Letters Answered and Discussed' and would appreciate having a personal reply with your views on this subject."—Harold W. Pierce.

(B) "Referring to letter No. 2201 appearing in your issue of March 24, and your answer thereto, I think you are astray when you make the statement you do as to the doubtfulness of the experiment spoken of being successful, as I have proved many times that this can be done, and that compression has very little if anything to do with the possibility of starting on the spark. In a number of instances I have removed completely the spark plugs from my car and after replacing them, started the engine on the spark. My theory is that if the cylinder is filled with an explosive mixture of gas, and the engine runs freely, there will be sufficient force to start same."—M. J. O.

(C) "In your issue of March 24, on page 599, we notice that in your answer to the question asked by the subscriber signing himself 'Amateur,' in the last paragraph thereof, you say it is doubtful if an automobile was ever made to start on the spark when the spark plugs had been removed, since the engine was run. This seems to be a common-sense view of the matter theoretically, but practically, it is dead wrong. The writer has done this many times, not only accidentally, but has done it intentionally with five or six people watching. In fact, if the engine and the mixture are carefully adjusted, the car will start on the spark at least nine out of ten times immediately after stopping. It will start about one-half the time if all four plugs are removed and then put back."—Waterman Brothers Company, Incorporated.

(D) "Regarding your answer and information to letter number 2201 in your issue March 24 (starting on the spark) you are entirely incorrect in your answer.

"I know that motors that have a very low compression start best from the switch, in fact, it is not unusual for an old motor to start from the switch the next morning after having been used the evening before say up to six or seven o'clock. The writer also remembers that in 1906 a car was put in a freight car, shipped and when this car was unloaded the motor started from the switch after being in transit for 5 days. Where was compression after such a length of time and after such a jar and jolt that a motor gets in transit?

"I also well remember that in 1906 I overhauled and thoroughly cleaned a 1905 motor, having the cylinders, pistons, and piston rings removed, reground the valves, and really had the crankshaft out of its bearings. Now, after reassembling this motor, setting valves and time of ignition, I injected a little gasoline through the pet cocks into each cylinder, and on throwing on the switch the motor started away beautifully, to my utter astonishment, without ever touching the crank. Where was compression in this instance?

"When I know facts like the above, I cannot let it pass by unnoticed, especially while you are telling your correspondent publicly that his informer was not quoting the truth, or rather, put it in such a way as to make readers believe that advice received had been a story. Trusting you will pardon me for butting in, I remain," Jas. D. Reber.

(E) "Have been a subscriber of THE AUTOMOBILE for some time and take a great deal of interest in 'Questions Answered and Discussed.' In the issue of March 24, 1910, I notice an article on starting on the spark in which 'Amateur' states that a manufacturer told him that he (the manufacturer) had removed his spark plugs from his engine, replaced them, and then started on spark. You express doubt as to the occurrence of this, or even its possibility. I noticed that my engine was missing, this morning, and placed the cause of it to dirty spark plugs, which I knew had not been cleaned for some time. About half an hour ago I took out the plugs and cleaned them one at a time, and replaced them in the engine; turned on the switch, and to my utter surprise, the engine started off on spark as nicely as it always does within two or three hours standing. The car has the same engine and ignition as when bought.

"I would like to hear further from you, through the columns of THE AUTOMOBILE in regard to this. I can prove the above assertion to any one so desiring."—Herbert L. Noll.

Some Facts in Relation to Gasoline Performance

The letters as here reproduced are representative of quite a number which were received in relation to this matter, and, without any exception, they all held to the same conclusion. It is

proper that they should be published, and the facts should be brought out. The only remaining question is, are the facts brought out?

It is believed that the answer (number 2201 in "Letters Interesting and Discussed") handled the matter rather too briefly, considering the responses it since brought out, and, while it is the necessity in these columns to be brief, there is nothing to prevent enlarging upon the subject elsewhere in THE AUTOMOBILE whenever the occasion demands, as it seems to in this case.

Gasoline Will Not Burn Except Under Compression

Just to show that there is a considerable chance for mistake and that an autoist can be laboring under a misapprehension, attention is called to the letter marked (A) in this series. This letter, among other entertaining statements, is made to state: "I removed my magneto plugs; I cleaned these plugs, adjusted the points, put the plugs back, threw on the spark, and the engine started." This statement would not be very unusual, were it not for the fact that magnetos are so made that, to realize a spark, it is necessary to rotate the armature to get the spark. In this, is an example, according to the language of the letter, of gasoline which "went off" without a spark. Of course, nothing of the kind happened. Either the car was provided with an auxiliary sparking mechanism, or the signer of the letter owes further explanation to the readers of THE AUTOMOBILE.

Disregarding the imperfections of language; coming down to the strictest interpretation, and to the facts, gasoline will not burn unless it is under compression. If this is so, then it is true that a motor cannot be started on the spark, if there is no compression. This compression does not have to be generated by cranking the motor; it will be induced when gasoline boils. Gasoline will boil at its boiling temperature to which it will be heated up; in the cylinders of a motor, if they are warm enough.

Starting on the spark, so-called, is easy enough, perhaps, after a motor has been run, due to the fact that the gasoline is then subjected to a temperature sufficient to cause the liquid to boil, and, as before stated, as the liquid boils, it generates pressure. It is not even the pressure alone that is at the bottom of the ignition of the mixture; it is the gasoline, in gas form, in the presence of sufficient oxygen that makes it inflammable.

If, when a motor is shut down, there is some gasoline present, the heat of the cylinder walls will transfer to the gasoline, and it will be changed in its state of aggregation from liquid to gas. To bring about this result there must be present the set of conditions as follows:

(A) The temperature of the walls and surroundings must be above the boiling point of the gasoline.

(B) The latent heat of evaporation of the gasoline must be equalled by the heat stored in the walls of the cylinders, counting only the heat that may be taken from the walls, before the temperature (sensible) of the walls falls to the boiling temperature of the gasoline which is to be vaporized.

The very fact that the heat stored in the walls of the cylinders is transferred to the liquid gasoline, and it, in turn, is vaporized, is a guarantee that a pressure will be generated. It is this pressure that is in some measure the equivalent of the compression which is induced by cranking the motor, and it is this compression which makes it possible to start, sometimes, on the spark, without previous cranking.

Pumping Losses Interfere With the Process

What are pumping losses? They are all the losses which have to be coped with when a motor is put into motion. They detract from the force of the power stroke. Were there no pumping losses, the motor, were it to be put into motion, would keep on running forever, or, until it assumes the form of a mechanical wreck. The losses, taking them as they come in general practice, are best indicated in the diagram as shown in Fig. 1, which chart was built for the purpose of determining the magnitude of the respective divisions of losses in a motor.

If the pumping losses are very great in proportion, it is then that the motor would start on the spark, so called, with great difficulty, or to put it in language more in keeping, with far less certainty. The pumping losses increase with the speed, but they are sufficient in poorly made motors to defeat starting on the spark, so called, owing to the feebleness of the force which it is possible to realize when the compression is limited to that which comes from boiling gasoline in the presence of enough air to provide the oxygen to produce a burning mixture, excepting in a motor's cylinder. Likewise, in a motor which is well made, even assuming that all the parts are so nicely fitted that friction is reduced to a very low point, if the cold compression is high, as it will be, that is to say, the compression which will come as soon as the motor begins to rotate, due to the fact that one piston will make its compression stroke, while another is on the power stroke, the power required to equal the force of the generating compression will be greater than the power which can be wrung out of a feeble explosion such as that which comes from igniting the mixture, residuum in character, as it will be found in the cylinders after the motor is shut down and allowed to stand until the temperature falls to the level of the surrounding, especially if the weather is below, in point of temperature, that which checks with the boiling point of gasoline.

Residual Compression Not Very Dependable

The briefly put discussion (number 2201) which precipitated a flood of replies, may be regarded as in accord with the facts, or not, just as point of view is taken. Confining the further discussion, for the moment, to the performance of a motor, allowing that it will, or will not start on the spark, assuming that residual compression is the source of the force available, then, it is believed, certainty of action is cast to the four winds, and speculation reigns. But it will fail to reach even the level of speculation, just so soon as the temperature falls below the boiling point of gasoline, for, even if the gasoline is in the vapor state, and present in sufficient quantity to permit of starting when the motor is shut down, the gasoline will condense in the course of a little time, when it will remain in the liquid state just so long as the temperature keeps below the temperature of boiling of the gasoline.

As a rather far-fetched illustration of the true situation then, let it be taken for granted that "earthquakes" are of the phenomena which human beings accept as possible, and even regular occurrences. Let it even be assumed that they do, at times, manifest the force sufficient to raise the habitations of man. Despite this threatening situation, even in view of the formidableness of the force, man goes right on putting up "skyscrapers." Transferring this simile to motor work, is it not reasonable to

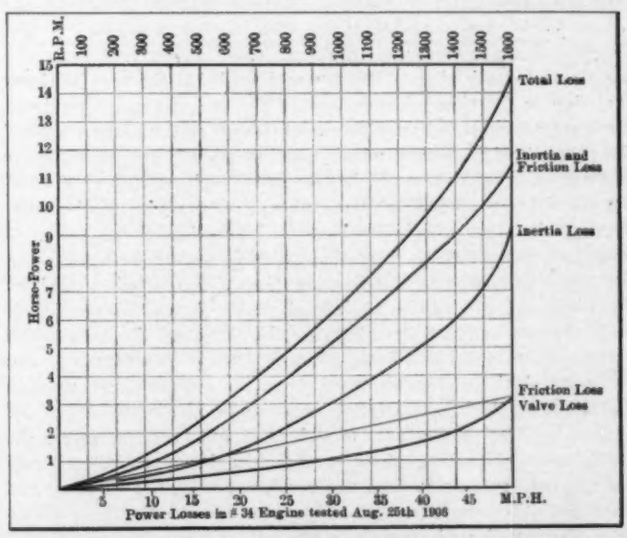


Fig. 1—Curve plotted to represent pumping losses in gasoline motors and subdivisions of such losses

inquire as to the reason why automobile builders provide cranks without fail; is it not a fact that starting on the spark, so called, like earthquakes, is just a little uncertain?

Since it is true, undeniably so, that starting on the spark is dependent upon the temperature, and temperature is a variable depending upon the seasons of the year, altitude, and local weather manifestations, then, in the light of cold hard facts (let us admit) unalterable facts, why say that a motor has the facility of starting on the spark?

Is it not better to stick to the main truth and merely remember that, if the weather is warm, or if the motor is in a heated condition, starting on the spark, so called, will be possible if the "pumping losses" of the motor are not excessive? Were it possible to so design motors that they would be independent of the condtions which respond to natural phenomena, then, and then only, would motor builders be justified in claiming that their motors would start on the spark, but does anyone think these motor builders would go to the expense of furnishing a starting crank, if they could control the acts of God, subdue the elements, and reverse the law of the conservation of energy?

For the time, space will not admit of going into the question of the characteristics of gasoline further than to conclude by reiterating the mere declaration, as has been made, that gasoline will not burn until it is vaporized, and that it will not vaporize (boil) unless it is heated to its boiling point, and supplied with enough heat to balance its latent heat of evaporation. The further elucidation of these characteristics of the fuel used in automobile motors, in view of the apparent lack of understanding of the same, will be as an agreeable task, to be undertaken at an early moment, as a supplemental statement to what has been said here in support of the fact that "an occasional occurrence is not entitled to the distinction of being termed a rule," nor can the user of an automobile rightly make the broad claim that his automobile will start on the spark, unless he can overcome Natural phenomena and the Laws, which, more than 95 per cent. of the whole time, prevent him from making good his claims.

No Spark Start for These 65 Cars

The futility of depending upon "starting on the spark" was conclusively demonstrated on broad, practical lines at the St. Nicholas Garage, New York City, on May 26.

In the garage there are 65 automobiles of all kinds and descriptions in daily use. Before they were taken out, the chauffeurs, were requested to start their motors on the spark. They all failed to get any result. The cars used for the experimental test comprised the following:

Car	Ignition System	Car	Ignition System
Lozier	Dual	Jackson	Double
Rambler	Double	Pope-Toledo	Coil
Franklin	Coil	Stevens-Duryea	Double
Autocar	Coil	Thomas	Coil
Pierce-Arrow	Double	American Mors	Double
Garford	Double	Pope-Hartford	Coil
Corbin	Coil	Grout	Coil
Selden	Dual	Reo	Coil
Buick 40	Dual	American Roadster	Double
Chalmers 30	Dual	Lozier	Double
Olds 40	Double	Pierce-Arrow 48	Double
Fiat 25	Magneto	Pope-Hartford	Dual
Packard 18	Double	Studebaker	Double
Maxwell	Coil	Aster	Double
Chalmers 30	Dual	Thomas 60	Double
Haynes	Dual	Simplex	Magneto
Garford	Magneto	Ford 6	Coil
Stearns 30-60	Dual	Maxwell	Double
Mercedes 50	Magneto	Elmore	Double
Olds	Coil	Locomobile	Dual
Chalmers	Dual	Studebaker	Magneto
Olds	Dual	Chalmers	Dual
Autocar	Double	Pope-Toledo	Double
Pullman	Dual	Pierce-Arrow	Double
Rainier	Double	Pierce-Arrow	Double
Thomas	Double	Reo	Coil
Stearns	Dual	Studebaker	Coil
Mercer	Coil	Buick	Dual
Stevens-Duryea	Dual	Buick	Dual
Peerless	Double	Marion	Dual
Thomas 50	Double	Cadillac	Double
Winton	Dual	Olds	Dual
Cadillac	Double		

In conclusion, let it be understood that there is no question of the practicability of starting on the spark, no matter which make of automobile is considered, provided the conditions are ripe, but it is not a dependable way of starting, nor is this method to be relied upon at all unless the temperature obtained is that which will boil gasoline.

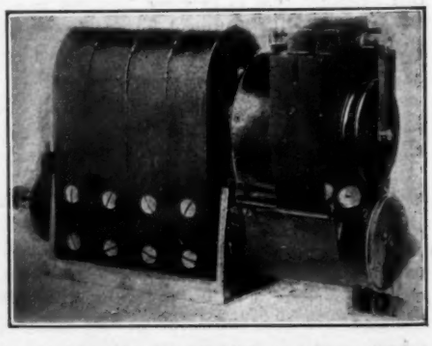
New Type of Racing Magneto Is Being Used

IF for any reason, such as poor gas, improper spark plug location or a half-dozen possible causes, the flame propagation in a high-speed motor becomes sluggish its efficiency decreases surprisingly as is well understood.

In tests made abroad the arrangement of two spark plugs, operated simultaneously, is found to have a marked effect on the output of the motor, and with this idea in view, a number of foreign racing machines were fitted with two magnetos, each operating a set of spark plugs. But it was found that the very slightest variation in the time of operation of the two magnetos rendered the system useless, because the spark which occurred first ignited the charge and the spark which came at an infinitely small space of time later, still came too late to be of any assistance in starting the flame propagation from two separate points of the combustion chamber. And it was found practically impossible to time two magnetos so that they would operate both plugs at the same instant. Even assuming that the original setting of the magnetos produced the desired result, it was impossible to keep the setting correct, owing to the wear of the mechanism driving the magnetos and also the wear on the interrupter points.

To avoid these difficulties, the well-known German ignition specialists, Unterberg & Helmle, who make the U. & H. type of magnetos, developed a new model of magneto which meets the requirements of racing motor service. In this new U. & H. racing magneto two armatures are employed mounted tandem, and running in the same armature spindle on one shaft. These armatures are fitted with two complete sets of windings, each set consisting of a primary and secondary winding. The most unusual feature of the magneto lies in the employment of but one interrupter to break the primary circuit of both armature windings, this arrangement producing the high-tension current in both armature windings at precisely the same instant. The magneto is equipped with a compound distributor, to which each armature winding is connected by conventional means. One set of plugs is connected with one distributor and the other set of plugs, of course, is connected with the other. Two safety spark-gaps, one for each circuit, eliminate danger of damaging the windings should the cables leading to the plugs be accidentally broken, which is not impossible.

This arrangement overcomes the objections heretofore found abroad and with this new type as shown the principle of operation proves worthy. In this double magneto is also employed the U. & H. non-adjustable interrupter, which eliminates ignition difficulties otherwise due to breaking or sticking of pivots, springs and insulation of the replating parts.



U. & H. magneto with double armature and single interrupter

Elastic Limit of Manganese and Other Bronzes

(Continued from last week.)

pounds per square inch. Had ordinary dividers been used, the values for the cast metals would have been placed between 30,000 pounds and 40,000 pounds per square inch. The strain diagrams from the extensometer tests show the general shape of the elastic curve of the metal, and permit the accurate fixing of the point of inflexion of the curve; the autographic diagrams, however, show not only the actual shape of the curve, but also why there is the uncertainty in the locating of the yield point or point of rapid increase in rate of stretching.

For comparison, the autographic diagram of a piece of commercial "structural medium" steel is shown as No. 1 in Fig. 3. At the scale of the diagram, no inflexion of the curve is seen until it suddenly breaks sharply, actually drops and remains practically horizontal until it finally picks up again. This jog is

TABLE 6—HALCOMB STEEL COMPANY TESTS

Autographic Tests All Specimens 1 in. (Approximate) Dia. by 8 in. Long

Mark		9902A	9908A	Q2992A	Q6434A
Number on Curve Sheet.....	1	2	3	4	5
Sample	Steel	Cast	Cast	Hot-Rolled	Cold-Drawn
Reduction of area, per cent....	53.6	8.3	14.1	53.2	38.6
Elongation, per cent.....	36.3	27.2	6.6	34.4	25.2
Elastic limit, lbs. per sq. in....	38,000	21,400	22,900	22,800	25,200
Tensile strength, lbs. per sq. in.	60,140	69,700	63,940	71,820	68,500

Commercial Tests (Made at Schenectady) All Specimens 0.5 in. Dia. by 2 in. Long

Sample	Cast	Cast	Hot-Rolled	Cold-Drawn
Reduction of area, per cent.....	54.8	22.4	44.9	39.9
Elongation, per cent.....	42.0	14.5	37.5	34.0
Yield point, lbs., per sq. in.....	25,000	26,000	30,000	44,000
Tensile strength, lbs. per sq. in.....	67,940	70,900	74,780	74,260

entirely characteristic of mild steel, and is found to a more or less marked extent in all steels, save perhaps the very hard varieties. There is, however, no break of any sort in the curves obtained from bronze; they are entirely smooth. Somewhere along the knee of the curve, the tester notes that the material is stretching faster; just where he notices it will depend upon the sensitiveness of the means employed to indicate stretch, and upon his skill and sharpness in observation. The jog in the steel curve is indicated simultaneously by the slipping of the dividers and by the dropping of the scale beam of the testing machine driven at constant speed. The scale beam does not drop when testing bronze; the operator finds the poise gradually traveling more slowly to maintain balance, but who can say when the change in rate began?

It is customary to find the yield point in mild steels, and in fact, in annealed steels generally, at about 50 per cent. of the maximum strength. The yield point in mild steels corresponds, for all practical purposes, with the elastic limit. As the steel becomes harder, due to increase in carbon or the addition of alloying metals, or to heat treatment, the yield point rises rather more rapidly than the elastic limit, although the difference between the two is not so great but that the former may be used in calculations, and the yield point itself is less sharply marked, though still observable if sufficient care is taken. The yield point in steel is accepted as a safe guide to the engineer, in deciding upon the maximum stresses that may safely be permitted in parts designed to carry load.

That no such dependence can be placed upon the so-called yield point, as it is determined upon bronzes, is evident; rather, recourse must be had to the slower but more accurate determination of the true elastic limit if safe data are desired. It is especially noteworthy that the sets found at the minimum values of yield point as usually reported are a very considerable proportion of the total stretch that has taken place in the metal at those stresses, and that sets are found at stresses which are but 40 to 50 per cent. of these reported yield points. Under certain conditions of dead load, a stress of 75 per cent. of the elastic limit is sometimes considered at least not unsafe; if such a load were calculated for bronze, upon the basis of the usual commercial test for yield point, instability of the part so designed would be inevitable.

Hot working of the metal has not materially improved its elastic properties, but has greatly increased its toughness, and probably in an extended series of tests, would have been found to impart uniformity. It is well known that this particular alloy is relatively difficult to handle in the foundry because of its sensitiveness to temperature of pouring and to changes in composition, at least in the sense of impurities in the constituent metals, and because of its great shrinkage, requiring large feeders and sink heads. As in other copper alloys, many of the ill effects of this sensitiveness may be largely overcome by hot working. The data here presented are too meager to warrant lengthy discussion of the effects of cold working of the metal; it is shown that in the case of bars of 1 1-2-ins. diameter, the effects of the cold drawing may have largely disappeared when 1-4 in. of metal is removed, except as shown in a lessened elongation. Neither hot nor cold working cause any change in the elastic curve of the metal; it remains a characteristically smooth curve. In other cold-drawn copper alloys, when tested without removal of surface, the elastic curve usually presents a much sharper bend at the knee than is found in the cast metal, or in the same metal when annealed; the same would probably be found with manganese bronze if tested as drawn, without turning. Cold-drawn metal, except wire, is seldom used without removal of the surface to provide means of fastening, and it surely is safer to test it as it is used rather than in the perhaps fictitious condition of strength due to skin hardness.

These results do not constitute a new discovery. In the literature of testing engineering, references may be found with

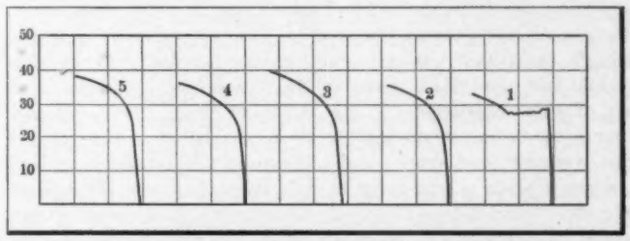


Fig. 3—Curves resulting from plotting Halcomb Steel Company's tests, Table 6

direct bearing on the subject; but in these days of rapid progress and short-cut methods, much that is old, or that may be found only by search, is apt to be forgotten or overlooked. Comparatively few laboratories have autographic machines, and the use of the extensometer with a specimen only 2 in. long is not very satisfactory because of the small extension of so short a length of material under stress. Many otherwise well equipped laboratories have no extensometer. So much of experience in testing materials is based upon work done upon iron and steel that it was perhaps a natural assumption that the characteristics of these metals would also be found in bronzes and similar alloys and hence that methods of testing used successfully with one would yield equally safe results when applied to the other. Test results which are misleading are exceedingly dangerous; they induce a false sense of security which may result in the failure of structures and lead to the condemnation of a material which would be perfectly satisfactory if properly applied and not unwittingly abused.

Engineering Digest

A carefully abstracted digest of accounts of engineering activities as they are reported in society transactions and technical papers throughout the world.

An Imaginary Automobile for 1915.—So as to convey gently a hint to manufacturers with regard to the improvements which might be incorporated in the productions of the industry at any intervening time, the author presents his idea of the supposedly standard automobile chassis of five years hence. All side levers have disappeared, so as to leave the entrance to the driver's seat at both sides of the vehicle entirely cleared of obstructions. The steering column carries the speed lever and a finger piece, which serves only to block the rear wheel brake pedal. There is also a front wheel brake pedal, but no brake on the transmission, such being required only by "scorchers," says the author. The dashboard is converted into a gasoline tank, giving sure-enough gravity feed to the carbureter, which is placed in a warm spot between the two batteries of the eight-cylinder motor, so as to require no water heating. The wheels are wire spoked, with large pneumatic tires, which the prophetic designer contemplates to operate with pressures of 9 pounds per square centimeter, viz., 58 pounds per square inch. The drive is by a rigid shaft from the speed change box, through torsion tube, to a single flexible joint connecting with a worm meshing with a helical gear, the rear end of this drive being suspended from two cross members of the chassis in a casing also inclosing the differential gear, which drives the rear wheels through a suspension consisting of universal joints *V* on the inner ends of the wheel drive shafts, and the braces *X* which are hinged to the differential casing, and with their outer ends form collars supporting the drive shafts close to the wheels. The suspension, which takes the place of the "rear X," is the real novelty in the author's conception. It is readily understood with reference to the side and plan views shown in the illustration. *O* is the fixed axis of this suspension. *P* are bell-lever struts, the horizontal arms being radius struts for the wheel shafts, while the vertical arms transmit road shocks and motions to the extension-springs *R*, whose tension is adjustable by a screw at *T*, where the springs have their front support through the member *S* mounted on the torsion tube enclosing the drive shaft *N*. (The author's conception seems a little hazy at this point.) The brake rods or wires *j* are balanced in action by the sleeve on the suspension axle *O*. The rear portion of the frame is arched over the rear driving system to give room for the spring action, but it seems that the author is willing to accept a somewhat peculiar participation of the rear wheels in all spring movements, or else he has overlooked this consequence of his design.

The motor is conceived as an 8-cylinder, 45 degree V-mounted, valveless creation supporting the radiator above it, on the thermo-syphon plan; and a centrifugal blower is on or in the radiator. The illustration shows other points. *Ja* stands for an oil gauge which is the only external evidence of the oiling system, excepting *Pa*, which is the cover of the internal oil pump. *Vi* is the drain. *E* is the tubular radiator, *Co* the tubes holding ignition wires. *Mg* is the high-tension magneto, *Ca* the carbureter with two independent jet chambers. *Se* are the supports and water connections for the radiator. Instead of the customary curved under-pan, the sheets *To* connect the false chassis *Fc*, on which the motor is mounted, with the frame reaches *Lo*.—L. Baudry de Saunier in *Omnia*, May 7.

The Ageron Self-Starter Mechanism, also adapted for inflating tires and blowing alarms, contains features worth noting. Apart from the main purpose of the device, the shape of the extension spring *c*, Fig. 2, attracts attention by the rounded ends, produced by diminishing the diameters of the terminal convolutions. This shape is seldom seen in American automobiles, though neat in appearance and rather well calculated to convey to the beholder an impression of finished and deliberate design, partly because it cannot be connected up so readily as the customary extension spring with the single-wire hooked ends, and therefore presupposes that the connections are shaped and placed in their position at the same place where the spring is made. The twice-wound pulley *a* in Fig. 2 would not be practicable, if it were intended to be rotated for more then about two-thirds of one revolution, as the cable would be practically certain to climb the pulley flanges, unless some remarkable material were found permitting the cable to slide readily transversely of the pulley-face while yet pulling without slip tangentially. But comparison of the length of the compressed-air piston stroke with the diameter of the pulley shows that the cable is not expected to turn the pulley much more than two-thirds of one revolution.

Fig. 2 shows the principle of operation for the self-starter mechanism, while Fig. 3 shows a complete installation, including an air-compressor to be connected with the motor, the air-conduits of seamless copper tubing, which is of 9 millimeters interior and 12 millimeters exterior diameter, and the "distributor" *I*, affixed to the dashboard, which is essentially a multiple air-switch, containing the check valve for the compressor, the pressure gauge, the safety valve with whistle alarm, the self-starter cock, the general release cock, a turn cock for tire inflation and another to the alarm siren or horn *K*, in Fig. 3.

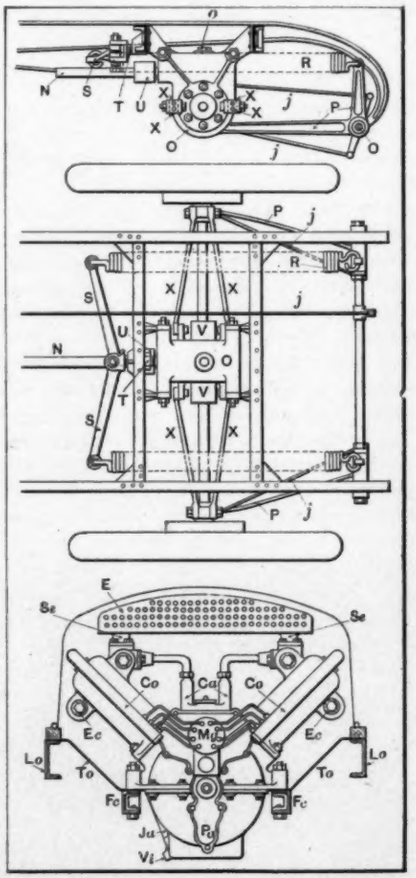


Fig. 1—Proposed type of automobile, which the designer thinks will hold sway in about the year 1915

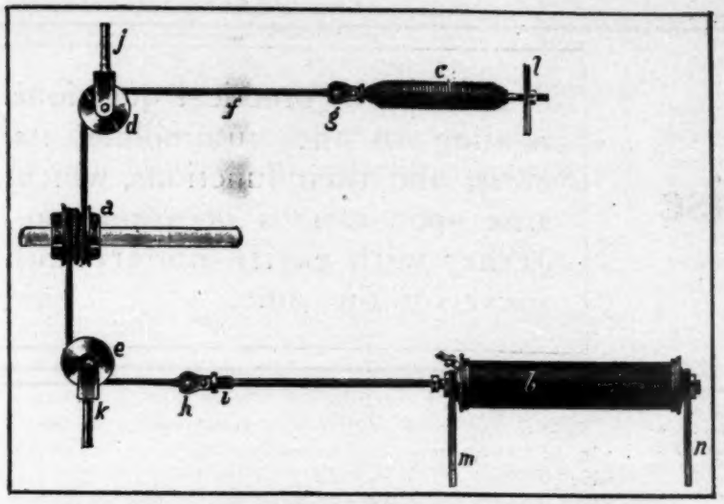


Fig. 2—Diagram of self-starter mechanism acting upon clutch shaft by means of compressed air

The pulley *a* in Fig. 2 is secured to the intermediate shaft between the clutch and the speed change and is provided with an interior free wheel. The cable *f* is secured at one end by the clip *g* to the retractor spring *c*, at the other end by clip *h* to the piston rod of the cylinder *b* and is guided by idlers *d* and *e*. The letters *j*, *k*, *l* and *mn* represent the means for securing the various parts to the chassis. For starting the motor, air is admitted to cylinder *b*, which pushes the piston toward the bottom of the cylinder; the cable pulls the pulley and the intermediate shaft around, and the motor is started, if the clutch has been previously engaged. The spring *c*, which has been extended by this action, thereafter pulls the piston back to its starting position and the mechanism is ready for operation again. In order to economize on compressed air, a special device, unexplained by the author, and designated as a regulator-economizer, forms part of the air tube leading to the cylinder *b*, as shown at *J*, Fig. 3. It regulates the admission of air from the tank *B* to the cylinder *C*, apparently by check valves.

In Fig. 3, *A* is the compressor, *B* the air tank, *C* the self-starter cylinder, *D* the free-wheel pulley, *E* the steel cable, *F* the retractor spring, *G* the clips for attaching the cable, *HH* the idler pulleys, *I* the "distributor," *J* the "regulator-economizer," *K* the siren and *L* the lever for operating the compressor. The compressed air may also be used for operating a jack of special design in case of necessity. It is unfortunate that it is not explained how the compressor is disconnected. As shown in Fig. 3 it is operated by sprocket and chain from the intermediate shaft, the same on which the free-wheel pulley is mounted. No mean are indicated in the article for applying the device to a shaft-drive automobile.—*La Vie Automobile*, April 9.

Superficial optical tests of metals, especially steels, forms one of the subjects in a series of articles by Jules Vinsonneau concluded in the April number of *La Technique Automobile et Aérienne*. As a critical and analytical review of the methods employed in France in the steel mills and in the laboratories, and a summary of the defects which may occur in materials, the article repays perusal in its entirety, the author advocating a much higher degree of uniformity in the dimensions of test pieces than is usually insisted upon. With regard to superficial optical tests which are frequently recommendable, especially when the more thorough methods are unavailable for one reason or another, the author dwells on the value of the darkened chamber in which the fragment of metal is subjected to scrutiny under strong light, and also on the need of examining tubes interiorly as well as on the outside. Only a few quotations can be offered. "They speak of silicon bronzes, of manganese bronzes; they praise special aluminum bronzes, etc., which give results in tensile and bending tests, comparable to those obtained with irons and steels!!!"

"What kind of tests were they? Were they made with thin and long test pieces or with thick and short ones? With what irons and what steels have these various bronzes been compared. Were the comparative tests made with test pieces of the same dimensions? Were the same prisms used for the bending and for the shock tests? Were the tests of fragility conducted with the same lapses in accuracy? A day will come, no doubt, when these uncertainties will be removed," nor will it be surprising if the progress desired is rapid.

"Cornut says: 'If we suppose that a piece of steel or iron is subjected to a continuous stress, slow and progressive, it is well understood that this stress is transmitted successively from molecule to molecule, in such manner that all the molecules are practically subjected to the same stress. On the other hand, if the stress is sudden, instantaneous, it is understood that all the molecules of the body cannot get time to communicate and distribute this stress, and that the first molecules affected may be loosened right in the beginning, while other molecules have borne no stress at all. The metals consequently may present very different qualities accordingly as they are subjected to slow or sudden stresses in the tests.'"

"In his note to the *Académie des Sciences*, Frémont expresses the following thesis on fragility: 'A steel is fragile, brittle, or not brittle, accordingly as the ratio between the tensile elastic limit and the elastic limit for compression is smaller or larger than 1.'

"At the congress of mechanics in connection with the Exposition of 1900, when it was demanded that the optical test of metals should be made obligatory, the matter was put to the test of a vote, after the theoretical and practical reasons for the proposition had been thoroughly discussed. Both the novelty of the method proposed and the fear of encouraging rejections of metals from the mills militated against it, and nevertheless it obtained a vote of 15 for and 19 against it. Under the circumstances this vote may be considered proof positive of the genuine interest attached to optical test methods."

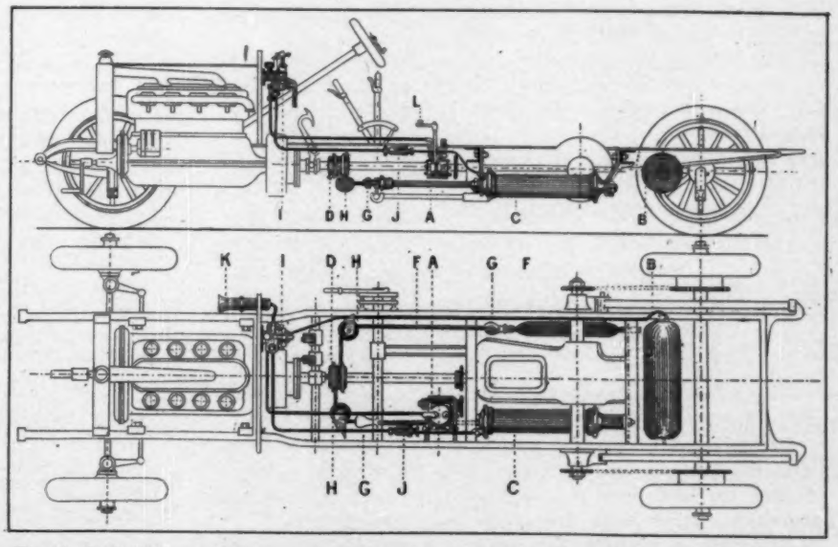


Fig. 3—Installation of air compressors and air tank in connection with self-starter mechanism acting upon clutch shaft and devices for inflating tires and operating alarms

Questions That Arise

A series of practical questions relating to the automobile, its parts, and their functions, which arise upon various occasions, together with easily understood answers to the same.

[42]—Why introduce such a complicated device as a differential gear system if the difference as above found is so slight; surely it would not damage the tires so very much to allow of this amount of slipping when a turn is being made?

True, the amount of slipping is not nearly so great as that which is likely to follow reckless driving with its skidding and the slipping which comes in every time the brakes are locked, or when the power is applied suddenly. But this continual skidding does damage the tires, and in the same way they would be rapidly depreciated were there no differential gear. On the other hand there is a more important reason for having a means which will prevent skidding when a car is going around a curve. The condition designated as "inertia" can not be ignored; according to the first law of Newton, when a car is at rest, it will remain at rest; or if in motion, it will move uniformly in a straight line until acted upon by some force.

When an automobile is in motion, if it is diverted from its straight path, it tends to travel in the straight line with the same force as that which its inertia represents, and if one of the wheels must skid, which will be true if there is no differential, it follows that the force of inertia will be more likely to overcome the tractive ability of the remaining wheel (at the rear end of the automobile), which, if it does, will cause the automobile to behave badly; an accident may follow.

[43]—How may this force of inertia be estimated?

If it is assumed that the tractiveability of the wheels with the ground is destroyed, it follows that the centrifugal force of the mass will be a proper estimate of the inertia component.

Centrifugal force is determined as follows:

Let

R = radius in feet of the curved path;

F = centrifugal force in pounds;

W = weight of the body in pounds;

N = number of complete revolutions the body must make in its circular path in one minute of time;

v = linear velocity of the center of gravity of the body in feet per second;

g represents the force of gravity = 32.16 as taken.

Then,

$$v = \frac{2\pi RN}{60}.$$

$$F = \frac{Wv^2}{gR} = \frac{Wv^2}{36.16R} = \frac{W4\pi^2RN^2}{32.16 \times 3600} = \frac{WRN^2}{2933} =$$

$$= 0.0003410\ WRN^2.$$

[44]—What is the numerical value of the force of gravitation? Is it the same everywhere over the surface of the Earth?

The force of gravity, designated in text books as g, increases with the latitude, and decreases with the altitude. At Paris, France, the latitude is 48° 50′ N., and the value of g is 32.181; the altitude taken being that of the sea level, which is 0.

According to Everett, the constant g may be determined as follows:

$$g = 32.173 - 0.082\ cos\ 2\ \text{lat.} - 0.000003\ \text{height in feet.}$$

In the United States it is common custom to take 32.16 as the value of g.

[45]—What is the reason for considering the force of gravity in connection with automobile work?

Everything that moves is retarded or accelerated by the gravitational force; going up hill it is retarded; going down hill it is assisted; on the level it is still under the influence of gravity and the force exerted must be reckoned with.

[46]—In what way does the force of gravity interfere with the travel of an automobile when the road is level?

Since, through the action of the force of gravity, a body will fall to the ground if it is free, the same force will act when the body is resting upon the ground, and with the same force; the body tends to fall all the time, and if the surface of the earth interferes with its further migration, a pressure will be exerted between the surfaces; if there is a pressure there will be friction; if there is friction it will take an effort to move the body against the resistance offered.

[47]—But an automobile is equipped with wheels; it rolls along the roadway; why should gravity have anything to do with it?

For the very simple reason that the rolling of the automobile along the roadway does not destroy the force of gravity. Were there no force of gravity, on the other hand, the automobile would not go either up hill or on a level. The reason for this is that there would be no traction; the wheels would slip and spin around, but the automobile would not go ahead. Traction, at it is termed, is but a manifestation of the force of gravity; when it is said that there is a certain number of pounds pressing on each traction wheel, which, considering the coefficient of friction, or adhesion, enables the motor to spin the wheels and cause the automobile to roll along the roadway, it is all due to gravity and involves the value of g at the time and place.

[48]—To what extent does gravity aid in the process of running an automobile?

As a practical example of the value of the force of gravity in the propulsion of an automobile, it is first necessary to determine the weight resting upon the traction wheels and then learn the value of the adhesion of the tires to the roadbed. Adhesion is variable, depending upon the nature and condition of the tires, also the nature and condition of the top dressing of the roadway.

It is common practice to assume that 60 per cent. of the weight of an automobile rests on the two rear wheels; weighing the automobile, then, is the first requisite, when the following will hold:

$$T = W \times 0.60^2$$

Which, for a 2,000-pound automobile, represents:

$T = 2000 \times 0.60 \times 0.60. = 720$ pounds on two wheels, 1-2 of which, 360 pounds, will represent the traction of one-half of the total weight.

Knowing the value of T (the traction), the power which may be utilized at the point of contact of each road wheel may then be determined at any speed of rotation which does not alter

the tractive ability. Unity may be taken for the speed, in revolutions per minute, and the following will hold:

$$\text{H.P.} = \frac{2\pi RST}{33{,}000} = \frac{6.28 \times 1.5 \times 1 \times 360}{33{,}000} = 0.1028 \quad \text{horsepower}$$

per revolution of the traction wheel, up to the point where traction is diminished by the conditions which increasing speed interposes.

In the above:

$\pi = 3.1416$;

R = radius of the road wheel in feet = 1.5 foot in this example;

S = speed of rotation of the road wheel in revolutions per minute = 1 revolution as taken;

T = traction in pounds, taken as 360 in this example;

33,000 = foot-pounds per horsepower.

[49]—This seems like a small amount of power; is it enough for the purpose?

It must be; automobiles do run; it is all the power that can be utilized in view of the force of gravity and the coefficient of friction of the materials used, considering the tires and the roadbed. Assuming that the road wheels travel at the rate of, say, 300 revolutions per minute, the power which can be utilized under these conditions will be as follows:

$$\text{H.P.} = \frac{6.28 \times 1.5 \times 300 \times (360 \times 2)}{33{,}000} = 61.66$$

[50]—How fast will the automobile go under these conditions?

It is extremely difficult to predict. The 1.5 foot radius taken in the formula demands the use of 36-inch tires in the wheels, and $36/12 = 3$ feet diameter, which, multiplied by $3.1416 = 9.42$ feet travel of the automobile over the roadbed for each revolution of the wheels. $9.42 \times 300 = 2{,}826$ feet per minute, and,

$$\text{miles per hour} = \frac{2{,}826 \times 60}{5{,}280} = 32.11.$$

[51]—Would it take so much power to drive a 2,000-pound automobile at the rate of 32.11 miles per hour on a hard level roadway?

No. There is no statement made in relation to the amount of power it will take to drive the automobile; what was ascertained is the amount of power which could be utilized in view of the traction available, and at the speed named.

[52]—How much power would it take?

Primarily, were it to take more than the amount above named, the automobile would not run; this is the point which is brought out by the above discussion, not forgetting that it explains something of the relation of gravitation. Just how much power it would take to drive a 2,000-pound automobile at the rate of 32.11 miles per hour on a hard, level road is difficult to state. If the internal loss, due to friction in the transmitting mechanism, etc., is 33 per cent, then, $61.66 \times (1 - 0.33) = 41.21$ horsepower is left to drive the automobile.

Having deducted the friction and other internal losses in the transmitting mechanism, it remains to account for "wind resistance," and such other factors as will add to the power requirement, after which it will be possible to fix upon the power the automobile will use, in which it will be necessary to include:

DISTRIBUTION OF POWER REQUIRED TO DRIVE

(a) Wasted at the point of contact of the tires.

(b) Used in deflecting the chassis springs in the process of affording good riding qualities.

(c) Dissipated in vibrations, deflection of all the members in the composition of the automobile.

(d) Dissipated in the deformation of the tires; molecular work in the compressed air in the tires, and in deflecting the roadbed.

(e) At every bearing in shearing the lubricant which is placed there to lower the power requirement, and prevent seizing of the metals which compose the bearing surfaces.

(f) In overcoming the force of gravity.

(g) Wind resistance is separate; increases with the extent of surface; is more or less dependent upon the form of surface, and is markedly affected by speed.

In view of all of the above factors, it is quite possible to state the power required for all automobiles; they do not all perform exactly alike; there is a marked difference between them, but it may be a fair estimate, considering average conditions, to put the rate of power required as approximately 150 watts per ton-mile (1 watt is equal to 1-746 of a horsepower). This would be the draw-bar pull, to which must be added the losses which come as the increasing speed brings on its quota of losses from all the sources as above set down.

There must still be a reserve of power in order to compensate for the effect of gravity on a hill; if a weight will fall to the ground, as it will under the action of gravity, it follows that to elevate the weight demands the expenditure. It is all the same whether the weight is in the form of a ton of coal or an automobile; it makes no difference whether the weight is lifted in an elevator or rolled up a hill in the form of an automobile or other vehicle.

METHOD OF LUBRICATION

[53]—What is friction?

According to Rankine, it is that force which acts between two bodies at their surface of contact so as to resist their sliding on each other.

[54]—How is friction characterized; is it designated in more than one way?

Yes. There is friction of rest and of motion, and further subdivisions as follows: (a) rolling friction, and (b) friction of solids.

[55]—What is friction of rest?

The force required to start a body sliding is called the friction of rest.

[56]—What is friction of motion?

The force required to continue a body in motion at a constant rate after it is started is called the friction of motion.

[57]—What is rolling friction?

The force required to roll a cylinder or sphere on a plane surface is called rolling friction.

[58]—What is friction of solids?

It was Rennie, in 1829, who experimented on the friction of solids, mostly under conditions of unlubricated (dry) conditions, from which the conditions as follows were reached:

(a) The law of solid friction differs with the character of the bodies rubbed together.

(b) The friction of fibrous material is increased by increasing the extent of surface and by time of contact, and is diminished by pressure and speed.

(c) With wood, metal, and stone, within limits of abrasion, friction varies only with pressure, and is independent of extent of surface, time of contact, and velocity.

(d) The limit of abrasion is determined by hardness of the softer of the two rubbing surfaces.

(e) Friction is greatest with soft, and least with hard materials.

(f) The friction of lubricated surfaces is determined by the nature of the lubricant rather than by the solids themselves.

[59]—What is the law of unlubricated friction?

According to A. M. Wellington (*Eng. News*, April 7, 1888), a fair expression of unlubricated friction is as follows:

(a) The coefficient of unlubricated friction decreases with velocity.

(b) Is maximum under conditions of minute velocities.

(c) Falls very rapidly with minute increases of minute velocities.

(d) Continues to fall, but at a very much decreased rate, as velocity departs from minute velocities.

(e) At higher velocities the coefficient is more nearly in accord with the conditions which obtain with lubricated friction.

Why Do Not All Use Friction Drive?

Editor THE AUTOMOBILE:

[2,275]—Under this caption THE AUTOMOBILE of April 14 printed four questions as follows:

1. "Why do not all automobile manufacturers use the friction transmission instead of selective or planetary, and do away wtih the disc or cone clutch, etc?"
2. "Is not the friction transmission more desirable on account of obtaining any speed from zero to limit on high gear?"
3. "Does not a car with friction transmission get more power delivered to the wheels than a car with any other kind of transmission of equal horsepower?"
4. "Is it not cheaper as to wear and cost of replacing to have a friction than a gear transmission? R. F. HENRY, Jr.

Palm, Fla.

The reply to this states that you "doubt if the average user of this gear used more than three or four of the speeds available." The very fact that the operator has at all times the exact "gear" or "speed" to give the best results explains why a good friction-drive car can run away from most gear-driven automobiles on steep hills and on bad roads, even though the gear-driven car has the more power. The operator of a friction-drive car can stop on a steep hill and upon starting can gain speed much more rapidly than most gear-driven cars with double the power, for the reason that he can increase his "gear" by such easy stages and with so much facility and promptness that he beats the "other fellow" to it.

You further state that "friction transmission of the simple disc type is never on high gear; that is, in the sense that a car with direct drive on the high can be." We are somewhat at a loss to understand how you arrive at this erroneous conclusion. Further on you state that "the friction disc must be replaced every few thousand miles." Our files contain hundreds of letters which prove conclusively that this is not the experience of the average user. Quoting from a few of these:

"I have run my car 11,000 miles and am unable to see that the disc is worn to the slightest extent. The filler, I believe, will be good for at least 3,000 miles before having it renewed"——

"The disc on my car is in first-class condition and the same filler is still on the car which I purchased from your agent a year and a half ago. The car has run a little over 6,000 miles, and I expect to have to apply a new filler in the near future."

It takes a handy man from thirty minutes to an hour to apply a new filler. The cost of this filler is about $3, so that you were right in your statement that the expense is small.

We feel in justice to the users and manufacturers of the friction-drive cars, that this reply should be put before them with the same prominence you gave the article referred to above.

Is It Right to Run On a Retarded Spark?

Editor THE AUTOMOBILE:

[2,276]—I find that I can slow my motor down by retarding the spark, but the radiator then steams. Should it? SUBSCRIBER.

Erie, Pa.

No. Running on a retarded spark is the best way to induce steaming of the radiator, and it has the further great disadvantage of causing the exhaust valves to warp so that they will have to be ground in. Adjust the spark to the speed of the motor, always in the advanced position if good result is wanted. Retard the spark a little when cranking to prevent a "kick back."

Is Doped Fuel as Good as It Is Said To Be?

Editor THE AUTOMOBILE:

[2,277]—1. Is there any fuel which can be used in automobile motors that will give more power and speed than automobile gasoline?

2. What is an "air lock" in the gasoline piping system?

Great Bend, Kan. SUBSCRIBER.

Composite fuel has been used to some extent; it may give a little more power under well defined conditions; it is dangerous to handle, and it is almost sure to damage the motor. THE AUTOMOBILE does not recommend its use.

An air lock in the piping system of the fuel system is precisely the same as the same trouble in a water system. To avoid it, so pipe the gasoline that there will be a "hydraulic grade." This condition will be present if water, after it is poured into the system (gasoline will do) will all flow out at the other end; there should be no low point where some of the liquid will settle and form a trap.

Method for Amateur to Vulcanize Patches

Editor THE AUTOMOBILE:

[2,278]—Will you please say through the columns of your paper which is the best method for the amateur to vulcanize patches on inner tubes, use raw rubber patches and vulcanizing cement, or use regular vulcanizing patches the same as used in cold patching and vulcanize with vulcanizing cement? W. J. MOORE.

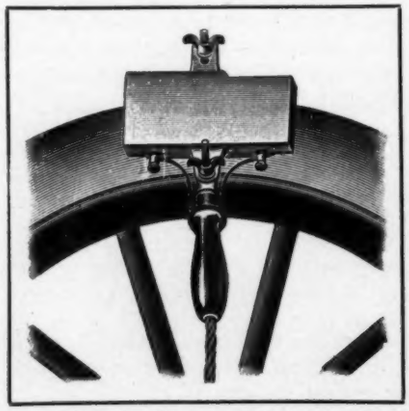
Caro, Mich.

There are two methods available to the amateur:

(a) The acid cure. When the patch is applied in the regular way, it will not stay on, because the cement is "green." Supply men have for sale acid which has the virtue of doing the work of vulcanizing the cement which is used for sticking patches in place, and, from service, it would seem to be efficacious.

(b) The illustrations here afforded depict a type of vulcanizer which works on the principle of heating at the desired temperature (250 to 275 degrees Fahrenheit) for a sufficient length of time to accomplish the purpose. This particular type of vulcanizer is made on the principle of the electrical rheostat, and when the electric current is applied, heat, at the required temperature, is generated, so that the amateur will be in a position to accomplish the vulcanization, if he will but use the vulcanizer, applying it in the manner as herein depicted.

It is not necessary to use electricity as a source of heat; steam, at a sufficiently high pressure to afford the right temperature, is used in the manufacturing process, so that there can be no question as to its capability, but it is something of a problem to use steam under the conditions which obtain when a repair is to be made, and for this reason the electrical equipment is preferred. As to the relative value of the two processes herein described, there is nothing to be said, excepting to point out that the heat method, using electricity, or any other suitable means, is the more natural way, and its best recommendation lies in the fact that it is used in the manufacture of tires, but it is first necessary to prepare the tire for vulcanization.



Vulcanizer in place ready to turn on heat

The remaining important matter is to see that the cement is of the right grade, and that the tire surfaces are scrupulously clean before any attempt is made to apply the patch. In conclusion, it is urged that repair work be started directly a tire shows that it is in need of attention. If the fabric is left uncovered dampness will creep in and "mildew" will follow.

Exact Definition of a High Tension Magneto

Editor THE AUTOMOBILE:

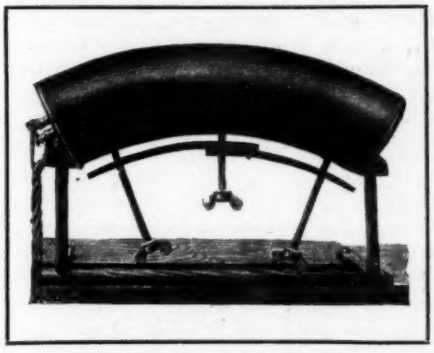
[2,279]—1. Please state the difference between a high and low-tension magneto.

2. What is the relation of a magnetic plug to either of these magnetos? A. P. L. DOHME.

Baltimore, Md.

1. The high-tension magneto is so designed that an auxiliary coil is not necessary; the high-tension current is impressed on a secondary winding which is placed on the armature of the magneto, over the primary winding. In the case of the low-tension magneto, it has but one winding on the armature and a wide-spark mechanism, placed in a cavity connected to the combustion chamber of each cylinder; the hammer and anvil of the mechanism "draws" an arc at the right time by opening the circuit.

2. In the magnetic plug mechanism, magnetism is used to cause the hammer to reciprocate, and the arc is drawn similarly.



Healing a wound on the tread of a tire

The advantage derived from using a high-tension magneto, in addition to the energy afforded, lies in the fact that the spark does not have to be advanced so much as when a coil is used; the "lag" is less in the case of the magneto with all windings on the armature of the magneto. It is "lag" which interferes with efficacious work, and in the manufacture of magnetos, the makers employ ways to eliminate time factors.

A Number of Questions Including Block Motor

Editor THE AUTOMOBILE:

[2,280]—Here are a number of questions I would like you to answer. I take this opportunity to let you know how much I appreciate your paper. I think it is the best paper in the field.

1. Is the block construction desirable in a 5 1-4 x 6 motor; if not, why not?

2. What is the matter with a spherical combustion chamber and an overhead camshaft?

3. Are the advantages great?

4. I have a friend who claims that he has a carbureter with an adjustable nozzle, and that he realizes more power by increasing the quantity of gasoline the situation demands. What is the reason for this? I have always thought that it was most difficult to adjust the flow of gasoline.

5. Can splash be relied upon to lubricate a motor?

6. In a book I came across the statement that a radiator can cool too much. Most people believe that a cool radiator is a good thing to have. What is the real situation?

7. I would like your criticism of the motor as follows:

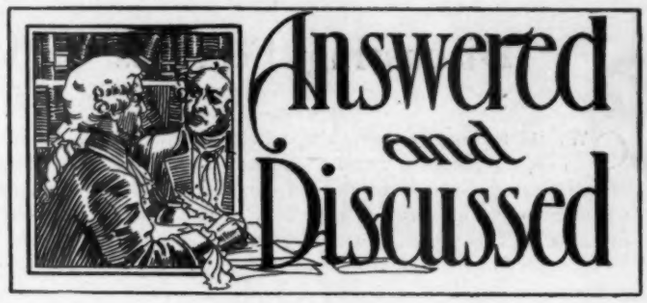
Bore and stroke, 5 1-4 x 6 inches, respectively.
Compression 70 pounds per square inch, absolute.
Horsepower rating (at 1,000 revolutions per minute) 44.
Compression volume 54 cubic inches.
Mean effective pressure 80 pounds per square inch.
Valves 2 1-4 inches in diameter and 9-16 inch lift.
Crankshaft diameter (three bearings) 2 1-4 inches.
Flywheel 16 inches in diameter.
Flywheel weight 66 pounds.

8. What would be the lift of the valves were they 3 inches in diameter?

9. What would be the length of the connecting rod? Would 12 1-2 inches between centers be enough?

10. Would a fan in the flywheel be sufficient, considering thermo-syphon cooling? R. C. GRAHAM.

W. La Fayette, Ind.



1. The block construction would add to the weight, for the reason that the distance between main bearings would have to be allowed for; twin cylinders are used when three main bearings are employed.

2. Nothing the matter with a spheroid combustion chamber; it offers the least flame-swept surface, hence requires the least cooling surface in the radiator for efficient work. The overhead cams will be noisy if the work is not well done. Good work can be done, and some of the makes of motors on the market are satisfactory in this respect.

3. The advantages are great enough to attract a school of designers who are looked upon as alive to the best situation—it is one good choice in motor designing.

4. Your friend may have what he claims; why not examine the carbureter and see if it is any good?

5. The splash system of lubrication is much used, and it works well.

6. It is possible to have a radiator that will do too much cooling; it is rarely ever approximated in actual service. No designer considers the chance of a too efficient radiator as more than a very remote contingency.

7. Bore and stroke are all right. Compression is a little low; add five pounds. Rating is too low. Fix the compression volume to afford a compression (cold) of at least 75 pounds per square inch (absolute).

8. The valves would barely break off of the seats.

9. The length, 12½ inches, would be a little long for the connecting rods, but it would not be objectionable in the presence of good designing; 11½ inches would be a low limit, perhaps.

10. The fan in the flywheel could be made of sufficient capacity to do the work; it would be necessary to have a tight hood, and the under-pan would have to fit also. This is a detail of more than a little importance; if the air leaks through the pan it will do no cooling.

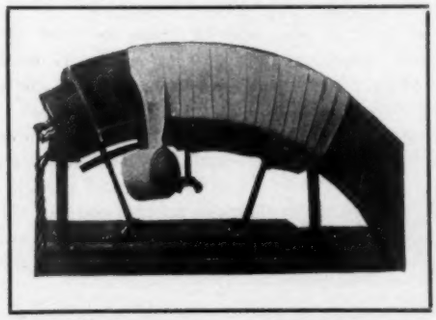
What Is the Best Lubricant for Transmissions?

Editor THE AUTOMOBILE:

[2,281]—Will you state the reason for the use of heavy lubricant in transmission gear systems, rather than cylinder oil?

Rutherford, N. J. F. E. ROGERS, JR.

Cylinder oil is high priced; heavy grease will do the work, and if it costs less it is advantageous to use it. Then, grease or heavy lubricant is more likely to stay in. Cylinder oil will do the work, besides using a sufficient quantity of lubricant, either hard or liquid, according to preference, maintain the parts so scrupulously clean that the lubricant will do the good that it is supposed to accomplish; it may do harm if the parts are not clean. It is well to remember that lubricant oozing out prevents dirt from migrating in, hence it is a good and efficient seal.



Wrapped tread, using tape to hold repair part in shape during vulcanizing

Discussing Features of Various Makes of Magnetos

By HERBERT L. TOWLE

OWING to an oversight, the article of May 19 on "Some Leading Magneto Details" did not contain an explanation of the wiring diagram of the self-contained high-tension type of magneto which appeared in the May 12 issue as Fig. 17. (See Fig. 5-a.) This diagram is accordingly reproduced herewith. The magneto is distinguished by two particulars: First, the high-tension winding, instead of being applied to a separate coil, is wound over the primary coil on the armature itself. It is carefully insulated from the primary except at one end, where both it and the primary coil are grounded on the armature core. The other end is led carefully insulated to a collector ring mounted on the armature shaft, and a carbon pencil rubbing on this collector ring takes off the secondary current and leads it to the distributor. The other respect in which this type differs from that shown in Fig. 16 is that a condenser is employed in connection with the interrupter to suppress the extra current.

Owing to the fact that the secondary coil of the high-tension magneto is located on the armature itself, it follows that it not only receives an induced current, due to the breakage of the primary current, but itself induces a current like that of the primary coil, but smaller in volume.

Let us now examine some of the commercial constructions used in geared magnetos. First, we will take up what may be called the conventional or standard types of (a) low tension, (b) low tension plus separate coil, (c) true high-tension magnetos. Later we shall note a considerable class of magnetos embodying departures more or less striking from the conventional type, and lastly, a group of unclassified magnetos.

The subject of dual ignition also will be taken up later on. Of low-tension geared magnetos there are at present three given makes, the Bosch, Simms, and Locomobile. Of these the last named is constructed only for use on Locomobile cars.

Fig. 1 shows the low-tension Simms magneto in outside view. The horizontal cross-bar at the end is carried by two studs on which it is insulated. This cross-bar carries a central plunger, making contact with the insulated bottom at the end of the armature shaft, as described before. An adjacent screw in the cross-bar serves as a binding post to lead the current to the bus bar and switch.

Fig. 2 shows the Locomobile magneto with the armature removed, thus showing clearly the form of the latter.

Fig. 3 shows the Bosch low-tension magneto in section. This form has plain bearings, but the same magneto is also made with ball bearings. The field magnets 1, armature coil 2, insulated stem 3 passing through the shaft, and insulated terminal 4 containing the spring-pressed contact button 5 are easily recognized. In this magneto the contact portion of the button is carbon instead of steel. The end plates 6, 7 contain little felt oil wicks 8, pressed upward by spiral springs and supplied with oil from the little oil wells surrounding them. These oil wells are filled by removing the covers marked "oil." Leather washers 9 prevent leakage. The ground current is returned from the frame to the armature core through the carbon brush 11, thus rendering it unnecessary for the current to pass through the oil film of the bearings; 16 is the dust cover, and 20 is an insulating washer of steatite or soapstone.

With magnetos of the types shown the spark is advanced or retarded by suitable mechanism acting on the igniters, and there is no advancing device in the magneto itself. The Bosch magneto designed for use with magnetic plugs, however, contains its own spark-advancing mechanism. Fig. 4 shows the end view

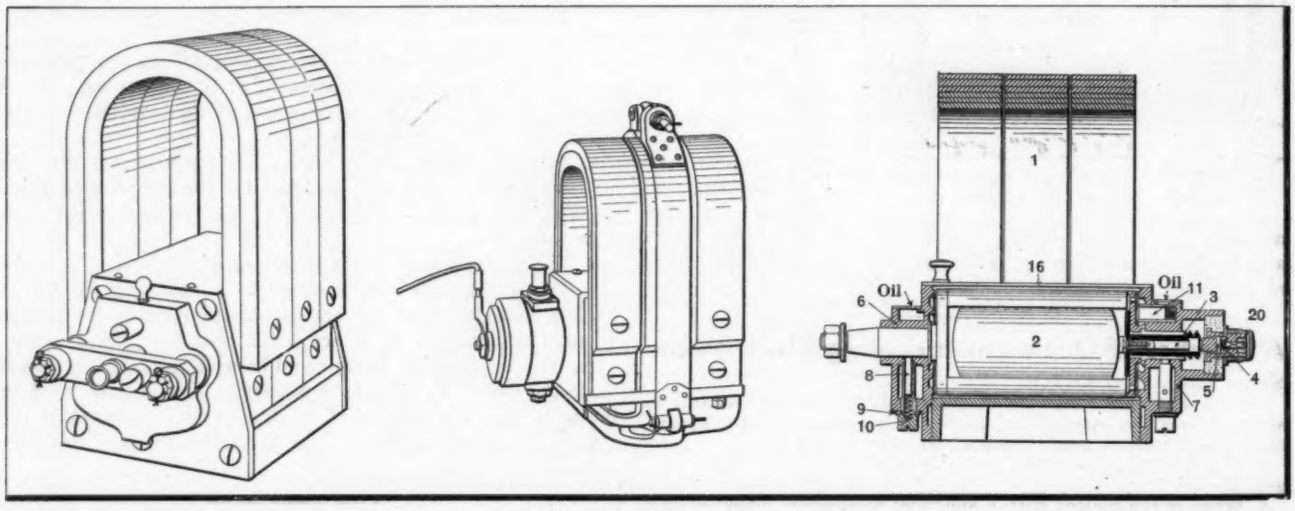


Fig. 1—Outside view of the Simms low-tension magneto. Fig. 2—Locomobile magneto wtih armature taken off, showing details of construction. Fig. 3—Section of the Bosch low-tension magneto and parts of same

of this magneto with the cover over the interrupter removed. Lever 10 is pressed by spring 8 into contact with the platinum screw 7, except when the other end of the lever strikes against cams 11. When contact is made the armature is short-circuited. When broken, a momentary extra current goes through the insulating block carrying contact screw 7 and through the spring 14 (turned aside in the drawing to permit removal of the cover plate), and from there through a distributing device, not shown, to one or another of the four terminals 18 18 at the top of the

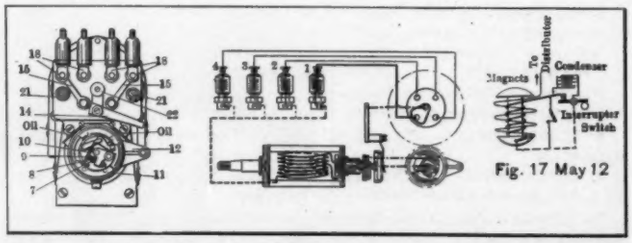


Fig. 4—End view of Bosch magneto containing spark-advancing mechanism. Fig. 5—Showing arrangement of details of same magneto. Fig. 5a—Wiring diagram of self-contained high-tension magneto

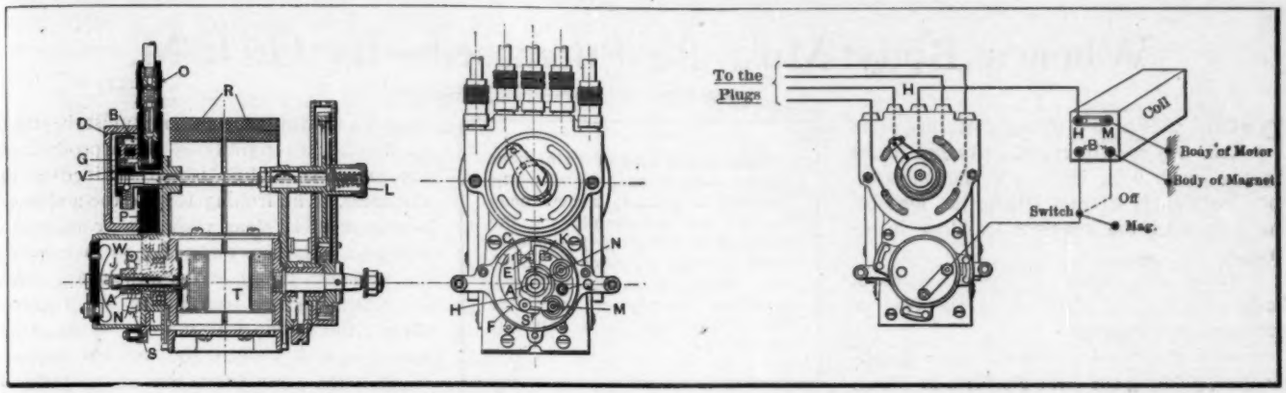


Fig. 6—Eisemann magneto with separate coil for low-tension current and "breaker box" for regulating spark time. Fig. 7—Wiring diagram of connections showing also manner of interrupting current

magneto. From the terminal the extra current goes to the magnetic plug screwed into the cylinder. This plug has an electromagnet with fine winding and a delicately balanced contact finger. The electromagnet, energized by the momentary extra current, attracts the contact finger and thereby breaks the magnetic plug circuit, producing a spark at the point of the contact finger. The diagram, Fig. 5, shows the general arrangement. Plug No. 1 is receiving current, and its contact points have just separated. The provision for spark advance alluded to just above is that the barrel-shaped casing from which the lever 12 projects may be rocked through a certain arc in either direction. The cams 11 11 are attached to this casing, and the lever 10 and contact screws turn with the armature.

A modified type of low-tension magneto, known as the rotating screen type, will be mentioned in a later article.

A less simple drawing, but still understandable if closely studied, is that of the Eisemann magneto, Fig. 6, which belongs to the second class in which low-tension current is generated and delivered to a separate coil. The field magnets R and armature core T appear as usual. One end of the armature shaft runs in a ball bearing, the other in a plain bearing similar to those in Fig. 3. The armature current is carried through the shaft by the insulated bolt W to the interrupter whose lever H works against the insulated contact screw E in the usual manner. When the armature short-circuit is broken by separation of the contacts, the momentary extra current passes through the bolt W, through a binding post on the cover plate, to the terminal winding of the outside coil, and thence back to the engine frame and magneto. This extra current induces a high-tension current in the secondary winding of the coil.

The interrupter is exposed for cleaning by removing the insulated cover plate, and the spark is advanced or retarded by rocking the "breaker box" or casing in which the interrupter mechanism is mounted. This varies the spark time as above explained in connection with the Bosch magneto for magnetic plug ignition.

The high-tension current generated in the coil is distributed to the plugs in order by the distributor running with two-to-one gearing reduction above the armature. The current enters by the terminal O, and is led from there to the revolving carbon brushes G and B, of which the former runs against the inner contact ring in the hard rubber of the distributor, and the second runs against the inlaid brass distributor segments in order. From these segments the current goes to the spark plug terminals. To inspect the distributor the cover D is removed. The hard rubber distributor arm V, carrying brushes G B, is also readily removable, being held on the shaft by a sort of snap clutch, a steel ball engaging a groove in the shaft, as the drawing shows. Fig. 7 is the wiring diagram showing the connections and also showing how the switch interrupts the current by short-circuiting the coil. A condenser built into the coil absorbs the first portion of the extra current and gives it up again in a sudden rush to the coil as soon as the condenser is fully charged.

Fig. 8 shows the Splitdorf magneto in external view. Its principle is that of the Eisemann, but the details are somewhat altered. The high-tension current from the coil enters the central one of the five hard-rubber bushings shown in the distributor cover. These bushings contain carbon brushes, of which the four outer ones receive high-tension current in sequence from a radial arm inlaid into a hard-rubber disc attached to the face of the distributor gear. Fig. 9 shows these distributor details. Fig. 10 shows the wiring diagram, of which the most important feature is that a battery is used for starting, the same coil and distributor serving both magneto and battery. Unlike most battery ignition systems, the battery is not grounded, but both terminals are connected by wiring to the coil.

(To be continued.)

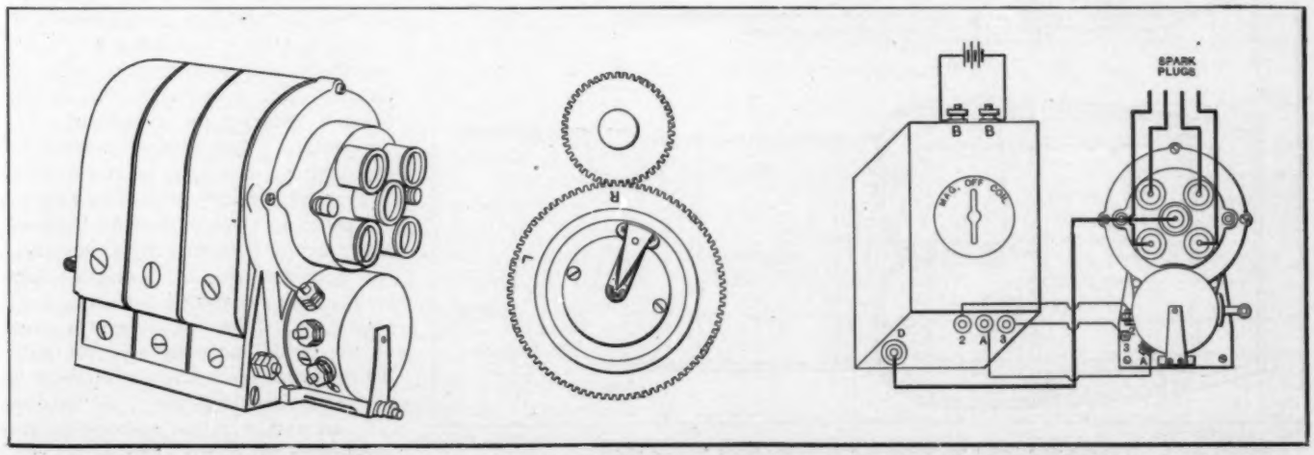


Fig. 8—External view of Splitdorf magneto and distributor. Fig. 9—Details of the same. Fig. 10—Wiring diagram showing battery used for starting, and terminals connected to coil

When a Body Must Be Purchased—By G. J. M.

This is the second installment of an article dealing with the process of putting a new body on an old automobile for the purpose of bringing the appearance of the automobile up to the most advanced standard, enabling the owner to utilize the chassis until it is worn out in service.

PROGRESS in the solution of this problem will require casual reference to the figures which were utilized in the introductory installment of this article, the idea being to afford the requisite building information.

Style *A* represented a type of runabout body with a clear platform at the rear to accommodate baggage.

Style *B* presented a torpedo stern attachment supplanting the clear platform as shown in Style *A*.

Style *C* depicted a so-called racy type of runabout body with a gasoline tank occupying a position to the rear of the seat, with means for slinging the extra tires in a diagonal position over the rear portion of the platform, clear of the gasoline tank.

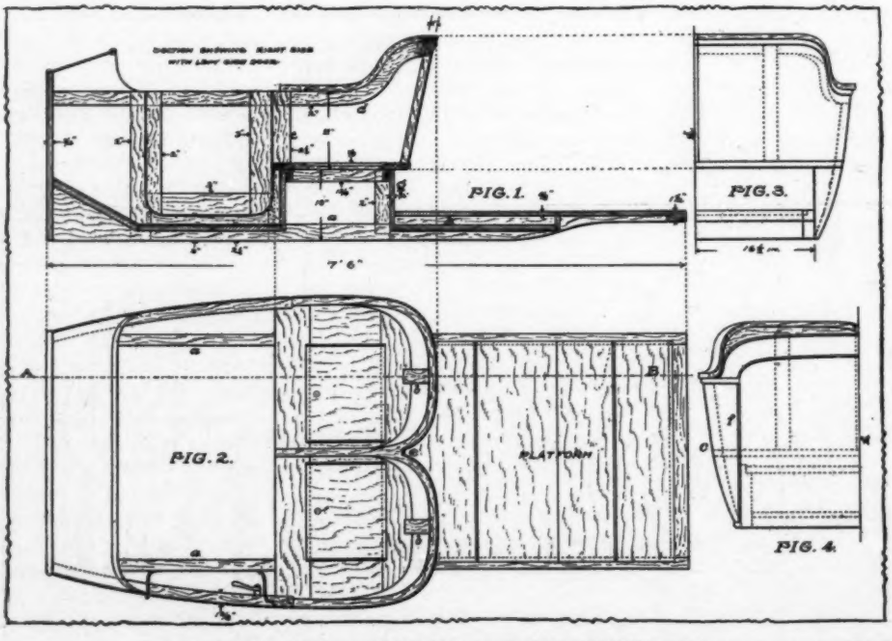
Style *D* showed a toy tonneau with a gunboat characteristic brought about by utilizing doors for all side entrances.

The whole effort has for its scope the idea of following along construction lines which are professional in character, capable of being executed with precision and despatch, enabling the autoist to choose at will, any one of the four styles as above indicated, or to change over from one to the other of the styles when the spirit moves.

In the construction of the Style *A* body, which constitutes the foundation for the whole work, reference may be had to the Figs. 1, 2, 3, and 4, as here given, and it will be understood that Styles *B*, *C* and *D*, may then be attached at will. Referring to Style *A*, and the figures, with a view to learning how the work is to be done in the construction of the body proper, Figs. 1 and 2 are made of ash in one piece 1 1-2 inches wide by 2 1-4 inches deep at the front, 4 inches deep at the rear of the seat, 8 3-4 inches deep at the toe, and 1 1-2 inches deep at the back end. The next step will be to provide a crossbar, which may be 2 1-2 inches wide, and, as the illustrations depict, it is framed in at a point of vantage.

Both the toe and backboards are made of 3-4-inch ash, but the platform boards, having less responsibility, are thinned down to 5-8-inch ash. Should it be desired to substitute white, or bass wood, for ash, account must be taken of the lack of rigidity of these products to the extent of adding 1-8 of an inch to the thickness. The ironing for the toe and backboards must be done with some care, and it will be a fallacy to undertake to save weight by utilizing flimsy irons which are made by bending strap iron up to the required shape; this product is inferior in its structure, nor will it afford the requisite measure of stiffness, since there will be no body of metal at the junction of the legs of the irons. If the irons are forged up, it will be an easy matter to leave a body of metal at junction points and to taper them away to the ends, so that the distribution of metal will be in accord with the needs, and weight will be saved on a deserving basis. The toe and back boards in this design rest on angle iron supports in stationary relation, using screws for holding. The boards shown directly above are removable, the reason being to afford ample leg room for the tonneau design. All bottom boards, excepting those which are rabbeted into the sills, are removable. The seat framing is of ash 7-8 of an inch thick, the side and cross members are lapped together, and the seat boards are 3-8 of an inch in thickness, made of white wood with cleats on the bottom and finger holes placed near the front edges; the boards rest in rabbets in the frame.

The upper frame *d* is of ash 2 inches deep by 1 inch thick, and is made of several pieces lapped together; it is framed to the posts *c* Fig. 1, and is supported by the posts *bb* Fig. 2, while the center post *e* (of which there are two) is of 7-8-inch white wood and is framed to the post *e*. The curve of the plan, and the shape, considering the side view, are determined on the rail *d*; then, the metal panel, which is of No. 16-gauge aluminum, is rolled to this shape. The top and bottom mouldings or beads are formed in the sheet with a beading former, and stock is left beyond the bead for a distance of 3-4 of an inch in length, which stock is turned at an angle to the sheet, and is used to fasten the panel to the wood frame, a clear idea of which will be gleaned by examining the section at the rear, Fig. 1.



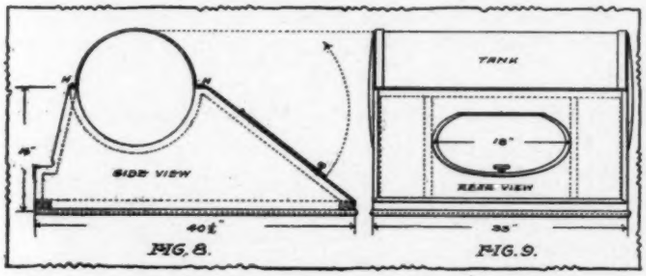
Foundation body work for the four styles of bodies shown

One piece of paneling is used for each seat shape, the fastening at the front being under a half oval solid moulding, or pillow marked *c*. At the pillow *e* the sheets are turned over and nailed, and in this way the joint is covered. In well-equipped body-making establishments, the panels for both of the seats are fashioned in one piece, and at the point *e* the paneling is depressed, but is not cut; this is a cheaper way, and it has the further advantage of affording rigidity, offering the additional inducement of reducing the amount of framing within. Still another method for the sake of economy is employed in large establishments in dealing with the top part. In place of turning the panel above the head of an angle to the sheet, it may be preserved in its original shape in line with the flat of the sheet, and a 3-4 by 3-4 inch bent wood strip is placed on the inside and outside of the metal. These strips are bolted or screwed together, sandwiching the metal between. The advantage to be realized in thus proceeding lies in the fact that the rail *d*

is eliminated, and the trimming rail is formed in its absence. Should there be an appearance of flimsiness, which the workman will note, it will be necessary to do a little ironing at this point.

The side framing in front of the seat is symmetrical on both sides with the exception that on the left side, where the rail at the top is cut between the posts to make the door opening, *e*, Fig. 1, which is a section in the vertical plane, to the right side on the line *AB*.

The space between the pillar representing the door opening is shown, and its construction will be readily appreciated. Fig. 2 shows the door correctly placed, and on the right side, the rail at the top is shown. The framing of the door and relating parts are made of 1 3-8-inch wood by the width as given in the drawing; this thickness is used with the idea of affording a certain stability to the door, and the fact must not be overlooked that the thickness changes somewhat, it being 1 1-8 inches at the bottom of the door. The side panels are made of No. 16-gauge aluminum, and are shaped by beating them out on a wooden form under a hammer, so that they fit the winding surface from the pillar *c* to the perpendicular line of the dash *f* (see Fig. 3). The panels so made are fastened under the half oval solid aluminum mouldings at the dash marked pillar *c*, and at the top as well as at the bottom. The moulding should be made to match the rolled moulding of the seat. In the doorway the panel is either bent at an



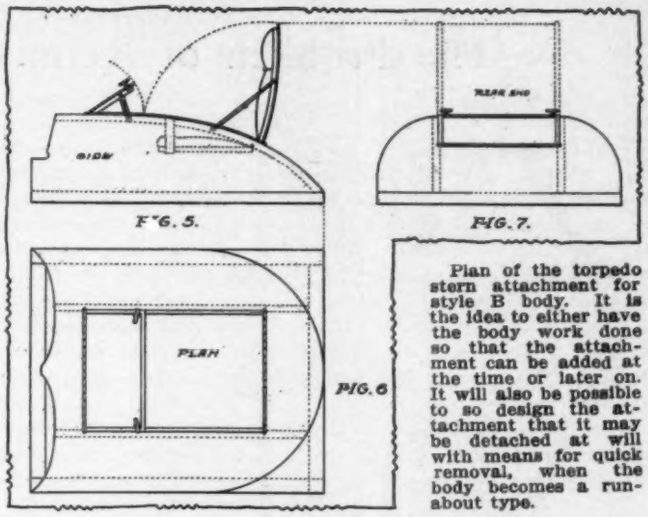
Showing method of proceeding for style C work

angle and secured to the face of the framing, or cut to the edge and fastened on the outside with small wood screws.

The hood is one piece aluminum, using 16-gauge sheets, shaped under the hammer, and, when it is put into place, it is fastened to the dash and to the side frames under the solid moulding. At the rear raised edge, a similar moulding is riveted to the top and to the underside; this forms an oval edge, and it offers the further advantage of rigidity. Body builders take advantage of the presence on the market of the various materials to be had, among which it is believed there is an oval form of moulding, so slotted as to receive the panel.

How the Torpedo Stern Attachment is Made

The torpedo attachment, which is used in the production of the Style *B* body, is illustrated in Figs. 5, 6 and 7, and as Fig. 2 shows, the attachment covers the entire platform back of the seat. This attachment is 12 inches high in the center at the front end; the framing is of wood, the thickness of which is 1-8 of an inch less than the thickness of the wood in the framing of the platform, as shown in Fig. 2 The side and end members are 1 1-2 inches deep by 2 inches wide and frame together. The top metal sheet is a one-piece, No. 16-gauge aluminum product, shaped to the curve, which is substantially a quarter of an ellipse. This shape does not cover the square end of the platfrom at the rear, but the metal is worked out from its normal curvature so that it flattens to the horizontal at a distance 1 1-2 inches up from the base line. This carries the metal over the top of the wooden frame at the corners. The metal is turned over the sides of the framing, and fastened near the lower edge. The effect will be appreciated by an inspection of Figs. 5 and 6 showing the end view, and



Plan of the torpedo stern attachment for style B body. It is the idea to either have the body work done so that the attachment can be added at the time or later on. It will also be possible to so design the attachment that it may be detached at will with means for quick removal, when the body becomes a runabout type.

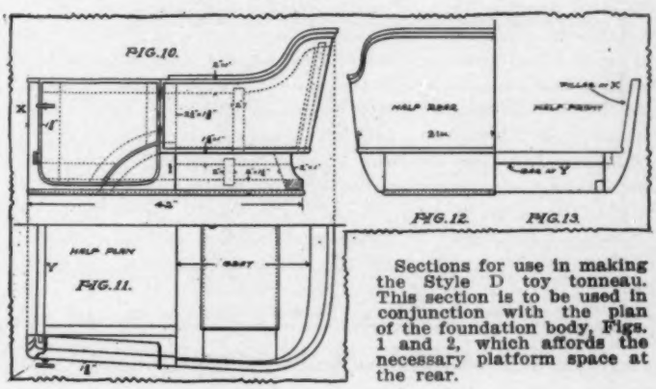
Fig. 7 which presents the 3-4 inch half oval. The next operation is to fasten a T-moulding to the underside of the frame, all around. This moulding will bind the sheet to the frame.

Construction of the Racy Type Attachment

The attachment which is used in the Style *C* body is illustrated in Figs. 8 and 9, and, as shown, this attachment covers the platform completely, and attention is called to the T-moulding which is placed to cover the drawing at the base line, and the metal panel at the front. The height at the front is 16 inches, and the gasoline tank is 15 inches in diameter, with a calculated capacity for 25 gallons of gasoline. In this construction the aluminum panels are No. 16 gauge, the side panels are turned to form an angle which flanges over for 3-4 of an inch. At the front, top, and rear, under the panel flange, an aluminum angle piece, 7-8 by 7-8 by 1-8 inches, is employed, and it is so shaped as to follow the top line of the side panel from back to front, being fastened to the wood frame at either end. Cross members of this same angle iron are shown as *hh* in Fig. 8, and they are riveted to the side angles, using gussets of 1-16 inch thick plate on the underside of the angle pieces, which gussets are all set in the upward direction for 1-16 of an inch, thus bringing the lateral angle pieces flush with the underside of the lateral panels.

Construction of the Toy Tonneau Attachment

The toy tonneau, which is designated as Style *D*, is quite completely illustrated in Figs. 10, 11, 12 and 13. This attachment covers the platform, and the framing of the seat door, and underbody remains as in the preceding example, excepting a difference in length which the drawings give. The seat is made to hold two adults, and the cushion and tonneau dimensions are also given. To this work the body framing and the door posts are framed. The front door post, or lock pillar, is fitted to the curvature of the front seat.



Sections for use in making the Style D toy tonneau. This section is to be used in conjunction with the plan of the foundation body, Figs. 1 and 2, which affords the necessary platform space at the rear.

The Problem of Refinishing Automobile Bodies

By M. C. HILLICK

EACH class of body offers a separate problem. The purchaser when he selects a metal body, for illustration, is inclined to reach the conclusion that he will be entirely free from troubles of every sort. It will be easy to tell him, with the expectation that he will believe it, that a metal body will not check, nor will it, like wood, be more or less destroyed by the force of a blow which would merely put a dent in a metal body. It also looks as if a metal body might be hammered out were it to become damaged. Then, it is a simple thing to point out that wood bodies are much affected by heat, moisture and the other ills of inclement weather.

From the point of view of the repair-man, particularly after the body reaches the paint shop, these nice theories are given but small consideration. It will be found that in hammering out a dent in a steel body it will be almost impossible to bring the sheet of metal back to its original smooth exterior, and it will remain for the finisher to cover up the imperfection by building up with roughstuff and rubbing down with water and artificial rubbing stone. Even this process should include, after the first application of roughstuff, suitable treatment with a hard variety of drying putty. Roughstuff alone will not prove adequate in the process of concealing the dents, and if a bulk of material is required, as it will be if the dents are conspicuous, the drying putty should be used instead.

Before undertaking to refinish a steel body, after it arrives at the repair shop, it is proper practice to carefully inspect every portion of the body, noting the condition of the paint and varnish, observing if there are any fractures, scale, or bruised patches, and having a care to touch up all such imperfections and blemishes, using metal primer and surfacer in equal proportions.

In case a complete refinishing job is to be undertaken, resurfacing with roughstuff comes first, to be followed by touching up with a coat of filler, which should be made of two parts, by weight, of white keg lead to one part, by weight, of roughstuff filler; mix these components to a stiff consistency in equal parts of coach japan and rubbing varnish.

After the application as above, and a lapse of 36 hours, it will then be proper to putty and draw putty all the prominent defects of the surface, stopping off only when there is no longer a foothold for the putty. The completion of this operation should be followed by a period of inactivity for 24 hours, when it will be proper to apply a coat of straight roughstuff which may be either shop mixed or procured ready to use from the manufacturer. From this point on the building up operation may be continued, applying a coat of straight roughstuff daily until the surface is balanced up. This will be the more complete if the process of rubbing, which is alternate with the application of roughstuff, is conscientiously performed. The end will be a uniform level foundation.

After rubbing out, the further processes are quite the same as those which obtain in painting and finishing wood work. In the steel structure the non-porous feature will always have to be coped with, and scale formation is likely to occur. Unless the finishing is very carefully done, the rust and scale problem will be a serious one. In preparing the new steel surface for painting, all rust and scale must be removed. This is best done by means of a sandblast in properly equipped establishments. In refinishing work, the sandblast is also the most effective, but the old burning process is sometimes resorted to, although it is next to impossible to do good work in this way. From the point of view of the owner of an automobile, who, naturally, desires first-rate work at a fair cost, the old burning process is to be shunned, not only on the count that the result will not be very good, but for the excellent additional reason that the cost will be relatively high.

In some establishments not fitted out with sandblast equipment there are solutions to be had which are more or less efficacious in connection with the removal of the old coat, or, if the plates can be removed, the practice which sometimes obtains in car building may be resorted to, in which the plates are immersed in a "pickle" consisting of 20 per cent. solution of oil of vitriol for a time sufficient to accomplish the purpose. After this, the plates are dipped in boiling hot running water, for the purpose of washing away the acid and scale; the plates are then dried, and coated with crude oil, excepting on the inner surfaces, which do not receive final finish, being given a coat of good mineral oil paint.

The plates may then be put back into place, cleaned with benzine, and scrubbed with a wire brush, to be followed with a trustworthy coat of primer. After 48 hours, under proper drying conditions, the surfaces may be re-coated with a mixture of metal primer and surfacer to be followed by a drying period of 48 hours. Puttying and putty glazing is then done, to be followed by two coats of surfacer on two consecutive days. After this, if the surfaces are not in good fettle, additional coats of surfacer must be applied until the desired ground is established. Three days drying will bring the finishing process up to the point where rubbing with artificial pumice stone and water will be in order, and when the groundwork will be sufficiently good to permit of the completion of the undertaking in the customary way.

Aluminum Bodies Are Troublesome

One complaint which is frequently heard in connection with aluminum body finishing takes for its basis the fact that around the edges of the aluminum panels the paint, when made of white lead base, wears off rather too soon. There is no very good explanation for this, but the fact remains that the paint is unseated for some distance back of the edges, although it is well to remember that aluminum oxidizes most readily. In order to get away from trouble of this sort, in so far as it is possible to do so, a reliable mineral primer and surfacer is used in the finishing process, which usually results in a substantial body sufficiently trustworthy to answer the requirement.

Considering wooden bodies, which are usually of white wood or poplar, excepting for the framing, which is of ash, the conditions are much more favorable from the point of view of the finisher. The white wood, or poplar, in the better class of work, is either blocked or canvassed on the inside surfaces, and, next to mahogany, it is the most desirable material for holding the paint and varnish. It is true that white wood and poplar shrink and expand to a considerable extent. This trouble, however, is minimized by chopping down the trees at the proper time of the year and treating the timber in accordance with its characteristics with a view to the elimination of troubles of this sort.

If the best grades of wood are selected for the purpose, thus reducing shrinkage and other troubles to a minimum, an old-fashioned primer may be used with the best result, and the subsequent surfacing materials will lay hold on the wood tenaciously. With the work thus undertaken, the ills of vibration, expansion, and force strains will have but small effect, nor will dampness accumulate sufficiently to change the character of the surface, whereas the work of the painter will be comparatively simple. In the long run, no matter which character of body is sent back to the paint shop to be finished, it will require the exercise of a fair degree of trade skill, the use of excellent materials and rather more time than the average autoist cares to contemplate. The durability of the finish will depend largely upon the skill and the time the artisan takes, but the artistic effect will also involve the use of a wise selection of the color to be applied to the body.

Other varieties of wood are unsuited for good reasons.

American Hubs with Single Ball Bearings

FRENCH technical papers keep a close tab on the doings of American designers, and it is interesting to note that American engineers are in the lead in divers ways, even to the extent, sometimes, of using ideas which are only known to the French school of design through the medium of the technical press. The following translation, which is literal from the well known French technical paper *Omnia*, is made the basis for these remarks:

American Hub with Single Row of Bearing Balls

Thomas J. Fay describes, in the American journal, THE AUTOMOBILE, a hub of which we give herewith a reproduction. We are much inclined to believe that this apparatus has been able to function, but in default of knowing on what vehicles, we are obliged to leave to this author the whole responsibility for its description.

"A very large ball bearing is secured with its inner race member C on the enlarged end portion B of a stationary axle. The spokes E of the wood wheel abut directly with their broadened, wedge-shaped inner ends V against the exterior race member of the ball bearing. Two disks of steel compress the spoke ends by means of bolts U seen in the cut. One of these disks F closes the front of the hub and is provided with a grease cap G. The other forms the brake drum H and the sprocket wheel crown K.

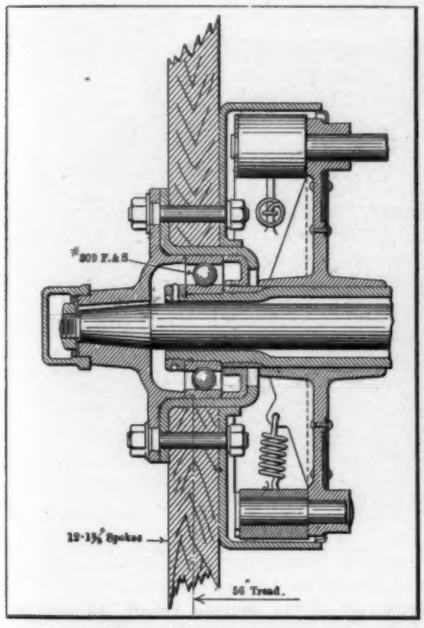


Fig. 2—Abbott-Detroit rear axle construction showing a No. 300 F. & S. annular type ball bearing in the plane of the rear wheel.

"It is undeniable that a single row of balls can easily carry the burden which rests on one wheel of an automobile. But this direc thrust is not the only one to which the hub of a wheel is exposed. The transverse stresses and especially the lateral shocks subject it to ruder tests. It may be a question whether a single row is as well adapted to withstand these forces as a hub formed of two rows placed at a distance apart.

"We do not believe it is impossible; and for this reason we present this original hub to our readers."

In order to show that the single ball-bearing design referred to in the translation from the French, and given here as Fig. 1, is now accepted and in particularly successful practice, it will only be necessary to present one or two samples, and for this occasion reference may be had to Fig. 2 of the Abbott-Detroit rear axle construction, and to Fig. 3 of the Marmon type of rear axle. Referring back to Fig. 2 for the moment, the illustration shows a No. 300, F. & S. type of annular ball bearing, placed in the wheel plane at right angles to the axis of rotation.

Referring to Fig. 3 the Marmon construction, the jack shaft S1 is flanged at its end F1, and a supplementary flange, F2, bolted to the flange of the jack shaft, is faced off and fits against a face on the hub member, H1, of the rear wheel on each side of the car. The hub H1 is bored out to take a single annular ball bearing, B1, and this bearing, while it does all the work, is dead on the center line of the wheel, so that it is in a position to assume all the responsibility. The ball bearing is a sucking fit on the reduced diameter of the bronze sleeve S2, and this sleeve fits over the drawn steel tube T1, which is concentric with the jack shaft.

The ball bearing is held securely in place in the most approved manner by means of a locked threaded shell, S3, and the jack shaft, which is of the semi-floating type, is prevented from floating off by the interference of the petticoat P1 of the hub member H1, acting in conjunction with the flanges F1 and F2, they, in turn, being secured in place by means of the hub flange bolts as shown, and the rivets R1, R2, etc. The hub cap C1 fits over the flange F2, and is held in place by cap nuts N1, N2, N3, etc., and the appearance of the wheel is somewhat unusual, due to the elimination of the conventional hub. The brake drum D1 is fastened to the spokes S3, S4, etc., and the drum, while it is of unusually large diameter, is also very wide, there being room for the two sets of brake shoes S5 and S6, with heat proof facings of a high coefficient of friction.

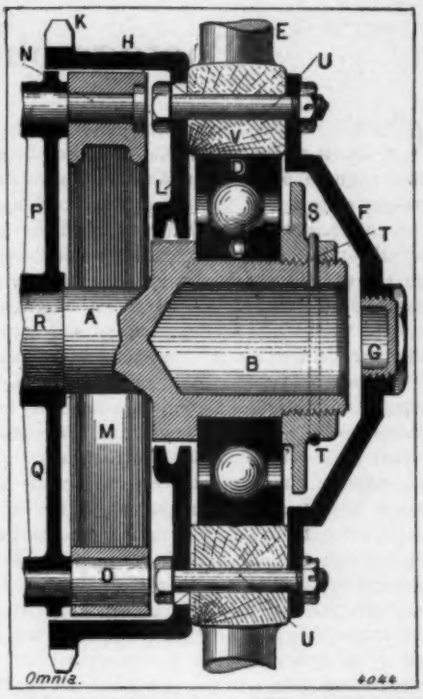


Fig. 1—American hub with a single row of balls. A, stationary axle; B, cavity full of grease; C, inner race; D, outer race; E, wood spokes; F, steel disk; G, hub cap; H, brake drum; K, sprocket chain crown; L, grease retainer; M, brake shoe; N, shaft for the two brake shoes; O, cam for operating brake; PQ, arms secured to the portion R of the axle; S, ball-bearing nut; TT, lock nut for nut S; UU, spoke-fastening bolts; V, inner spoke ends abutting directly against the ball-bearing race D.

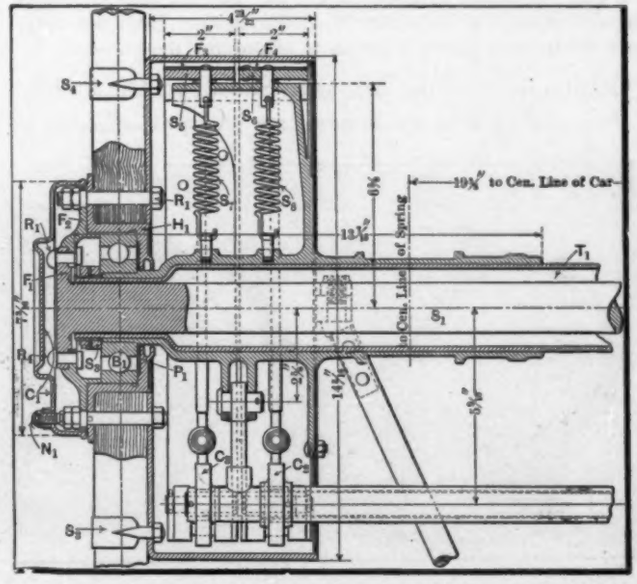


Fig. 3—Marmon type of live rear axle employing a single annular ball bearing in the plane of the wheel

Photographic Insight Into the Mea Magneto

COMPACTNESS in a magneto is second only to an energy spark at the propitious time, not forgetting, however, that the magneto occupies an auxiliary position on one side of the motor, exposed to the silt of the road as it blows in through the interstices of the radiator, part of which passes by and out through slits in the pan, but a goodly portion finds lodgment on the various surfaces under the bonnet, and it has great persistence in that it will creep in through small crevices and mingle with the working parts of the magneto or what not, to the detriment of the fine mechanism concealed within the housing.

In the magneto of the subject, compactness is one of the virtues which will be rendered apparent by glancing at Fig. 1. Moreover, it is shown that the vitals of the apparatus are protected most carefully, and, more, means are afforded for quickly dissembling the magneto, either for the purpose of removing same from its position in the car, or for the lesser intent, should it be desired, to detach a part from the whole. The saddle S1 into which the magneto M1 is placed is bolted down by two holding bolts, one on either side, through lugs L1, and the bottom side of the saddle is planed to a true face, in order that the magneto will securely rest upon a ledge, which may extend out from either half of the crankcase, or upon a shelf, which may be bracketed to the crankcase. The driving gear, if it has a suitable tapered hole in its hub, may be pressed upon the tapered projection of the armature spindle S2, and a nut N1, with a washer W1 behind it, is responsible for the pressure demanded in fetching the gear up against the taper, and holding it in place.

To fully appreciate the niceties of the situation, it will be necessary to turn to Fig. 2, which shows the motor M1 taken out of the saddle S1, and the quick release clamps C1 and C2, which are hinged at H1 and H2, have projections P1 and P2, which engage locking straps S2 and S3, taking advantage of locking cams C3 and C4, which hook over and throw past the center when pressure is applied to the spherical ends of the handles H3 and H4. An adjustment is provided so that if the faces of the cams do not come in the right relation, or if they show wear in time, the distances may be altered to accord with the necessities.

The next step in the procedure is shown in Fig. 3, in which the magneto M1 is partially dissembled, and the cover C1 is taken off, thus exposing the rotor R1, and the distributor shaft S1, also the carbon brushes C2, C3, etc., and the gear G1, which imparts motion to the shaft S1, taking motion from the armature shaft upon which a pinion is placed for the purpose.

Components of the Magneto Shown in Dissemble

The vital parts of the magneto are presented separately in Fig. 4. The armature (rotor) R1, having been removed from the fields F1 and F2 in the housing H1, presents evidences of mechanical refinement, the diameter being made exact by precise machining methods, so that when the armature rotates on its bearings in the end members M1, the air gap distance between the periphery of the rotor and the juxtaposition polar faces is reduced to mere clearance, so that the reluctance of the air gap is minimized, and the flux density of the magnetic field, as measured in lines per unit of area, is the highest obtainable value. The shape of the permanent magnets is shown in Fig. 5. The field piece is formed in dies (hot) from suitable grades of steel, having in view the fact that retentivity is a factor of the first importance. The potential ability of this form of magnet, expressing it in magnetomotive force, is primarily high, due to the careful selection of material and the method of treatment, but the effectiveness of the field is increased materially by virtue of a favorable leakage factor, all of which, in addition to the large polar area in conjunction with a diminished air gap, leads up to the desired result, namely, a high-tension spark possessing a large energy component.

Fig. 1—Mea magneto as it appears ready to go into place on a motor, with means for bolting the same down

The front plate M1 is held in place by six screws; when they are removed the plate may be taken away also. The armature spindle S1 rotates in ball bearings B1 and B2, at either end, and an examination of the plate M1 will disclose the location L1 for one of the ball bearings, which is duplicated at the other end. The mica-built condenser C1 is concentric with the armature shaft S1, fetches up against the liminæ of the armature R1, sandwiching between it and the insulating spool S2 of the slip-ring S3, thus affording to the condenser a position of advantage, protecting it perfectly from rough usage, and helping materially to maintain compactness of the apparatus as a whole. The breaker B3 on the secondary shaft S4 comprises a suitable spider, and a flat spring carrying the contact point, including a suitable adjustment requiring the use of a screwdriver in the process. The breaker removes together with the armature, and its action in service is promoted by two cams, which are held by screws to the housing of the wheel. Contact is interrupted through the office of a roller

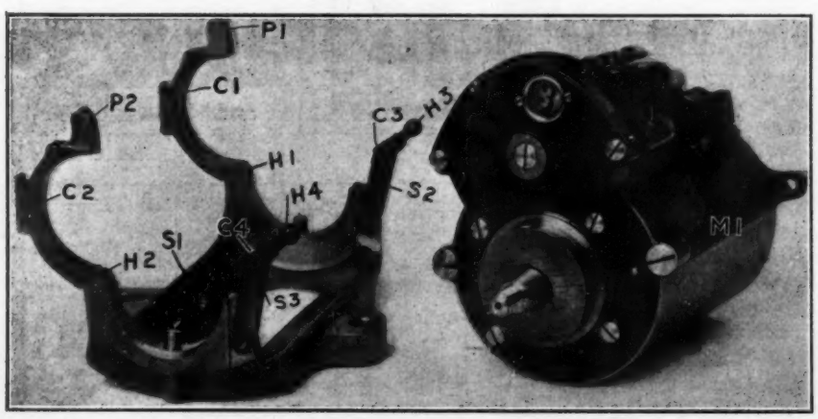


Fig. 2—The magneto after it is separated away from its saddle, showing the details of the saddle

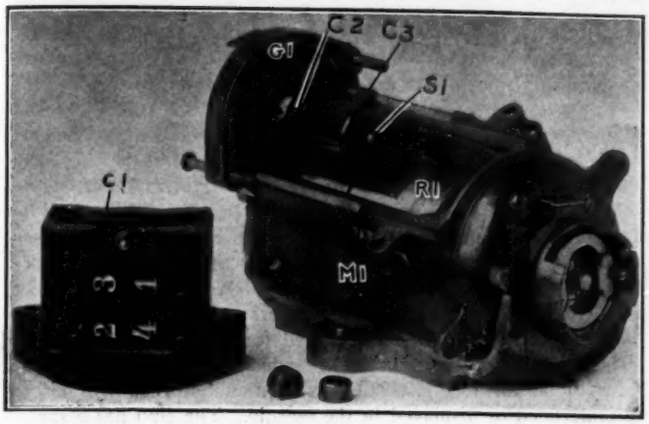


Fig. 3—When the cover is taken off, showing the interior, with a good view of the rotor and other parts

which is timed in view of the requirement. The roller glides on steel discs; they are hard and the motion is easy, so that appreciable wear is deferred.

In the application of the magneto to motors, those with 4 cylinders require that the crankshaft speed of the motor be that of the magneto. For motors with other numbers of cylinders, considering the use of this particular magneto, speed adjustments would have to be made accordingly. The timing levers are attached to suitable lugs, one on either side of the magneto. When the field magnet is run by means of this timing gear a steel disc with two cams, which are held tight by screws to the housing of the field magnet, imparts motion in the required direction to the contact breaker, which is rocked with the field magnets. The breaker will open in all positions between the maximum advance and the maximum retard at the same relative position between armature and field, so that the arc maintains the same intensity. The range of timing is from 60 to 70 degrees, which is quite in excess of the ordinary requirement, but which affords relief from troubles of this character, under the most unusual conditions. There are divers mechanical refinements which take into account the principles which underlie perfected mechanisms, and with a view to merely indicating something of the scientific way in which this magneto was contrived, it is pointed out that the contact breaker opens in the direction of the axis of the armature, hence centrifugal force, which cannot be eliminated, does not act against the good-working qualities of the breaker. The result is that contact is firm, chattering is entirely absent, and the spark produced is entirely free from interfering ways, such as would surely be set up in the electromagnetic couple, should contact be intermittent.

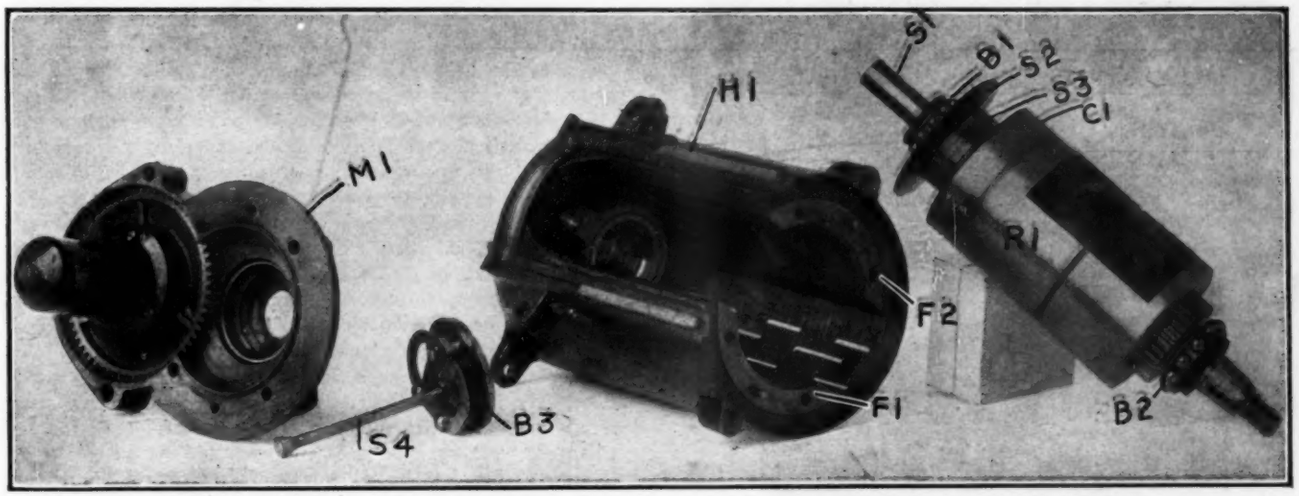


Fig. 4—Components of the magneto after the same is taken apart, presenting the permanent magnets within the housing

Alloys Used As Bearing Metals*

A rather interesting thing about alloys containing sodium is based upon the fact that sodium by oxidation produces a material which will saponify with oil used in bearings.

Investigations have resulted in little progress involving all possible alloys of different materials in different proportions. The recent introduction and placing on the market of a large number of metals, such as calcium, etc., very common in nature, will depress cost, and many of them possess suitable properties for bearing alloys.

COMPOSITION OF BEARING METALS.

Alloys	Lead	Tin	Antimony	Copper	Zinc	Other constituents
Babbitt 1	80.00	20.0	....	....	....	....
Babbitt 2	72.0	21.0	7.0	....	....	....
Babbitt 3	70.0	10.0	20.0	....	....	....
Babbitt 4	80.5	11.5	7.5	0.5	....	....
Babbitt 5	0.5	68.0	....	1.0	31.5	....
Babbitt 6	...	20.0	....	....	80.0	....
Babbitt 7	...	86.0	10.0	4.0	....	....
White metal	82.0	....	12.0	6.0	....	....
White brass	...	64.0	....	2.00	34.0	....
Magnolia metal	80.00	4.75	15.0	trace	....	Bi = 0.25
Car brass lining	80.5	11.5	7.5	0.5	....	....
Ajax plastic bronze	30.0	5.0	....	65.0	....	....
Ajax metal	11.5	11.5	....	77.0	....	....
P. R. R. car brass, B	15.0	8.0	....	77.0	....	P = 0.80
S bearing metal	9.5	10.0	....	79.7	....	....
Delta metal	5.1	2.4	....	92.4	....	Fe = 0.1
Camelia metal	14.8	4.3	....	70.2	10.2	Fe = 0.5
Tempered lead	98.5	0.08	....	0.11	....	Na = 1.30

Bi = bismuth; P = phosphorus; Fe = iron; Na = sodium.

From *Machinery*.

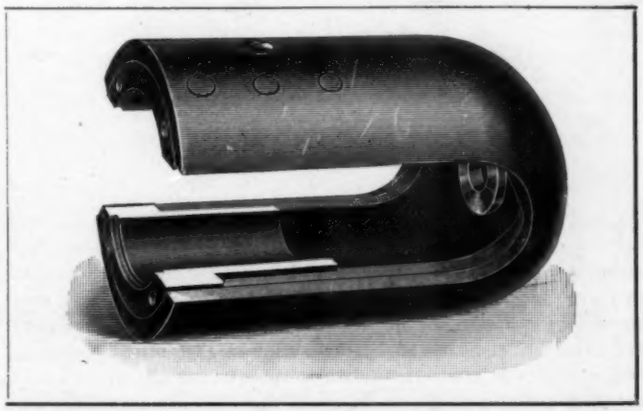
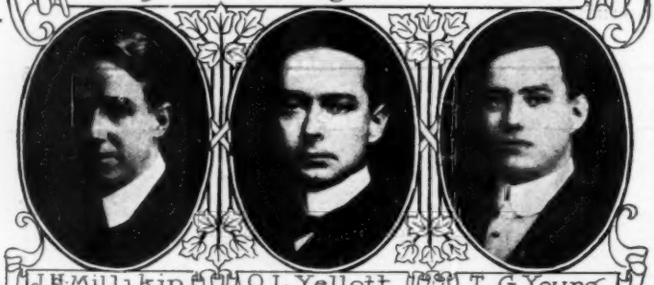


Fig. 5—Showing the shape of the permanent magnet system

Automobile Club of Maryland

Reception Room of Auto. Club of Maryland, Showing Office in the Rear



J. H. Millikin, Pres. — O. L. Yellott, V. Pres. and Counsel — T. G. Young, Treas.

Exterior View Automobile Club of Maryland

H. M. Luzius, Sec. — T. G. Hutchison, Asst. Sec.

BALTIMORE, MD., May 30.—During the nine years that the Automobile Club of Maryland has been in existence it has steadily grown in importance, not alone to the owners of cars in this city and State, but to the public in general. It has ever stood by those who obeyed the laws and has seen that they have not been unjustly treated by the authorities of certain sections, and it has been severe in its stand against reckless drivers. In carrying out this phase of its work, the club has cheerfully co-operated with the authorities in prosecuting speedists.

In recent years the club has taken a more active part in the business and sporting sides of the automobile. It has been active in advocating laws that are fair; it has promoted two of the most successful shows ever held in the South and it has backed a number of contests, such as endurance runs, sealed bonnet contests, hill climbs and the like. At present it is preparing for a hill climb to be held on the Belvedere Hill in June.

In regard to the Swann Motor Vehicle Law, recently passed by the Maryland Legislature, "the club," to use of the words of its counsel, Osborne I. Yellott, "is strictly on the fence." There are certain sections of the law, however, which, it is known, are not at all to the liking of the club members and the organization is having 5,000 copies of the act printed for distribution among the members. The features of the law which the club does not consider to be for the best interests of the motorists will either be underlined or displayed in the margin. The club has a membership of something like 250 which is increasing.

The Automobile Club of Maryland was organized in the days of the infancy of the motor car, at a time when there were hardly more than a dozen autos in the State. The first meeting was held at the residence of the late James E. Hooper, Jan. 28, 1901. Ten were present and became charter members. James E. Hooper was elected president; C. Warner Sttork, secretary; John W. Garrett, vice-president, and Ernest J. Knabe, Jr., treasurer.

On March 14, 1906, the club held its first meeting in the present quarters, 12 West Mount Royal avenue. On Feb. 26, 1906, it was formally incorporated under the laws of Maryland.

By its by-laws, the objects of the club are declared to be "the promotion of a social organization, composed in whole or in part of persons owning automobiles for personal, business or private use; to afford a means of recording the experiences of members and others using motor vehicles; to arrange for pleasure runs and to encourage the development of the auto as a means of pleasure driving and commercial transportation; to co-operate in securing rational legislation and the formation of proper rules and regulations governing the use of motor cars in city and country, and to protect the interests of owners and users against unjust or unreasonable legislation, and maintain the lawful rights and privileges of owners of all forms of automobiles, whenever and wherever such rights and privileges are menaced; and, on the other hand, to bring about, on the part of club members and auto users generally a proper sense of regard for and obedience to all laws and ordinances on the statute books, so long as they are law; to discourage fast and reckless driving and disregard by motorists of the right of others properly using the highways of the State; to promote and encourage in all ways the construction and maintenance of good roads and the improvement of existing highways, and generally to maintain a social club devoted to automobiling and the interests of motorists."

The club's home is one of the handsomest and best equipped buildings of the kind in the country. The stair landing opens into the two main rooms and into a ladies' room. On the Mount Royal avenue front there is a large reception room tastefully furnished, the color scheme being a light green. Glass doors, which form the front of this room, open upon a balcony, from which one has an extensive view. Immediately to the rear of this room, and communicating with it by a large archway, is the meeting room of the club. The color scheme of this room is red and black. In this room all the latest magazines devoted to motoring are to be found. To the rear of this room are the locker room and bathroom.

One regular meeting for the transaction of business is held on the second Tuesday of the month and a regular social meeting on the fourth Tuesday. On other Tuesday evenings there are informal social meetings.

On the fourth Tuesday evening of each month the entertainment takes the form of talks on the construction or operation of automobiles, illustrated reminiscences of tours by members, or, occasionally, musical or literary programs. Now and then

a smoker or card party is held, and almost always the house committee provides refreshments more or less Bohemian in character. These social evenings have proved a great feature in the life of the club.

The club stands for good roads, and is ever ready to do anything that, in its opinion, will advance the cause.

The Automobile Club of Maryland has always stood for the abolishing of toll roads throughout the State.

The club during the past year took up actively the matter of erecting road signs leading to Washington and Belair.

Membership in the club is divided into five classes, honorary members, life members, active members, associate members and associate lady members. The honorary membership is limited to 25 and includes, ex officio, the President of the United States, the Governor of Maryland and the Mayor of the City of Baltimore. The members may elect as honorary members any persons distinguished for their political, scientific, industrial or administrative capacities. Life membership is secured by an active member commuting all his subsequent annual dues by the payment at one time of $250. Active membership is limited to 500 members. The entrance fee is $20 and the annual dues $20. By a recent action of the club the entrance fee has been waived for all persons becoming members prior to July 1, 1910. Persons residing more than ten miles from the City Hall, Baltimore, are eligible as associate members. They are entitled to all the privileges of membership except the right to hold office or vote.

Something over a year ago the club found it would be necessary to have a paid official in charge of the clubrooms. Thomas B. Hutchison was named as assistant secretary to perform such duties. He always has on hand in the clubrooms a full set of maps and route books covering Maryland and other sections. He also has printed copies of the laws of other States and blank applications for licenses or registration. In this and divers other ways the club is keeping up the interest all the time.

Officers: C. Howard Millikin, president; Osborne I. Yellott, vice-president and counsel; H. M. Luzius, secretary; Thomas G. Young, treasurer; Thomas B. Hutchison, assistant secretary.

Board of governors: James Stone Reese, Dr. H. M. Rowe, Joseph M. Zamoiski, Joel G. Nassauer, Edward S. Dickey, H. M. Luzius.

Chairmen of committees: James Stone Reese, house committee; Edward S. Dickey, membership; Thomas G. Young, exhibitions and contests; Joseph M. Zamoiski, runs and tours; Osborne I. Yellott, laws and ordinances; Dr. H. M. Rowe, printing and publication.

Coming Events in the Automobiling World

June 20-July 6....Detroit, Mich., Industrial Exposition. Detroit Board of Commerce.
Dec. 1.....Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 17-24, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Feb. 13-25, 1911..Chicago Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

June 2.....New York City, N. Y., Trade Association, Orphans' Day Excursion to Coney Island and Return.
June 4.....Philadelphia, Pa., Track Meet of Quaker City Motor Club.
June 4.....Worcester, Mass., Fourth Annual Hill-Climb, Dead Horse Hill.
June 6-14.....Atlanta, Ga., Reliability Run to New York City, New York Herald and Atlanta Journal.
June 7.....New Haven, Conn., Hill-Climb up Shingle Hill, Yale University Automobile Club.
June 10-11.....Fort Erie, Ont., Track, Race Meet under management of Buffalo interests.
June 11.....Portland, Ore., Road Races of Portland A. C.
June 11.....Wilkes-Barre, Pa., Annual Hill-Climb up Giants' Despair, Wilkes-Barre Automobile Club.
June 14-15.....New York, Reliability Run of Motor Contest Association.
June 14-30.....Cincinnati, Seventh Annual National Reliability Run for Glidden Trophy, Through the Southwest.
June 16-22.....Albany Automobile Club, Albany, N. Y., Sixth Annual Tour to Atlantic City and Return.
June 18.....Ossining, N. Y., Hill Climb of Upper Westchester Automobile Club.
June 18.....Baltimore Hill-Climb of Automobile Club of Maryland.
June 25.....Port Jefferson, Long Island, N. Y., Hill-Climbing Contest, Automobile Club of Port Jefferson.
July 1-10.....Los Angeles, Cal., Road Carnival of Licensed Dealers.
July 2-4.....Los Angeles, Cal., Speedway Meet.
July 4.....Auburn, N. Y., Hill Climb of Automobile Club of Auburn.
July 4.....Cheyenne, Wyo., Track Meet of Cheyenne Motor Club.
July 4.....Dallas, Tex., Track Meet of Dallas A. C.
July 4.....Indianapolis, Ind., Cobe Trophy Race. Held on Speedway Track, Chicago Automobile Club.
July 4.....St. Paul, Track Meet of Minnesota State Automobile Association.
July 4.....Wildwood, N. J., Track Meet of Motor Club of Wildwood.
July 4.....Wildwood, N. J., North Wildwood Automobile Club, Race Meet and Club Run to Track.
July 11.....Plainfield, N. J., Hill Climb of Plainfield Automobile Club.
July, Middle of...Richfield Springs, N. Y., Hill Climb.
July, Middle of...Grand Rapids, Mich., Road Race of Grand Rapids Automobile Club.
July 18-22.....Milwaukee, Reliability Run, Wisconsin State Automobile Association.
July 18-23.....Milwaukee, Wis., Tour of Wisconsin State Automobile Association for Milwaukee Sentinel Trophy.
July 30.....Wildwood, Pa., North Wildwood Automobile Club, Race Meet and Club Run to Track.
Aug. 1.....Minneapolis, Minn., Reliability Run of Minneapolis Automobile Club.
Aug. 3-5.....Galveston, Tex., Beach Races, Galveston Automobile Club.
Aug. 15.....Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.
Aug. 15.....Start of Munsey Tour.
Aug. 17.....Cheyenne, Wyo., Track Meet.
Sept. 2-5.....Indianapolis, Ind., Speedway Meet.
Sept. 3.....Wildwood, N. J., Reliability Run of North Wildwood Automobile Club.
Sept. 5.....Wildwood, N. J., Track Meet.
Sept. 5.....Cheyenne, Wyo., Track Meet.
Sept. 5.....Wildwood, N. J., Speedway, Labor Day Race Meet of North Wildwood Automobile Club.
Sept. 17.....Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.
Sept.....Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.
Oct. 1.....Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
Oct. 8.....Philadelphia, Fairmount Park Race, Quaker City Motor Club.
Oct. 15.....Long Island Motor Parkway, Grand Prize, Automobile Club of America.

Foreign Shows and Races

May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.
May 28-June 9...St. Petersburg, Russia, Automobile Exhibition.
June 2-8.....Prince Henry (German) Touring Competition.
June 13-18.....Scotland, Scottish Reliability Trials.
June 20.....French Voiturette Race.
June 21.....French Stock-Car Race.
June 22-July 5....Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.
June 27.....Speed Trials at Kiev, Russia.

THE AUTOMOBILE

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REPETITION of a statement, presenting it as the outline of fact, even though it may not be, gives to it the tone of truth without the substance. How it is possible to be hypnotized into believing that a thing is so, despite the fallacy it conceals, is no more fittingly illustrated than when the question of starting on the spark is given the investigation it deserves, in view of a wide belief in the efficacy of the plan. Scores of correspondents, generously differing with a statement which was made in "Letters Interesting, Answered and Discussed," were all in complete accord, each offering apparently conclusive evidence of the alleged fact that starting on the spark should be regarded as a normal expectation, even though the combustion chamber in each cylinder of a motor is relieved of compression before the effort is made.

There are times when certain types of motors, notably those with four or more cylinders, working four-cycle, will permit of starting on the spark, as it is called, but the best way to ascertain the proper range of this idea lies in giving it a trial under practical conditions, involving enough of the various makes of automobiles to permit of striking an average. In view of the wide interest which seems to be taken in this phase of the autoing situation, the Editor decided to put the idea to test, and a garage was selected which permitted of handling upwards of 100 automobiles, most of which represented the higher-priced products, but, taking it on the whole, they represented a sufficient range of thoroughly good automobiles to make the demonstration thoroughgoing. The result of the test may be stated briefly: Sixty-five automobiles were tried by the chauffeurs who run them, and strange to relate, in view of a persistent tradition, not one of them offered to support the contention that "starting on the spark" is a normal expectation.

It will be fair to state that the attempt was made in the morning as each chauffeur came into the garage for the purpose of taking his car out. Each was accosted and requested to start his car on the spark, rather than to use the starting crank. It may be interesting to observe that not one of them seemed to be oversanguine, but they nevertheless agreed to make the attempt, which proved to be futile in each case. The conditions were normal, nor was the weather cold. A variety of cars were represented.

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IGNITION methods are being refined up to the level of the most fitting requirement, and in step with the progress which is being made in the other departments of the industry, just now the double spark idea is being tried out in racing automobiles abroad, for the most part, but in America to some extent. The method of procedure involves the use of a magneto unit which is provided with a double armature, and a distributor which is so contrived that the two sparks are delivered simultaneously. Two spark plugs are used in each cylinder, they being placed at diametrically opposite points, so that the mixture is ignited from two points of vantage, thus hastening the flaming of the mixture so that there will be less, if any, combustion going on during the period of the power stroke. This plan seems to be good, in that it increases the weight and thermal efficiency of the motor; it also affords a good measure of safety, and it reduces the number of accessory units. Since the double magneto will still furnish one spark, if the part of it which furnishes the other is out of order, it offers a means of dispensing with the customary auxiliary ignition system.

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MOST conspicuous among the motors which have won renown in aviation work are those in which the cylinders revolve in a vertical plane, the motion dispensing with the flywheel and its weight, with water-cooling and with the fan. Air-cooling generally has, of course, received the benefit of renewed investigation in France, where it had been once somewhat lightly discarded. The same is true of the two-cycle principle, and of the double-opposed horizontal motor, and, having let themselves loose, the French designers have taken the step in full and have lately produced a two-cycle, double-opposed horizontal, air-cooled motor which appears to do excellent work. At the same time, the five, seven and nine-cylinder motor with the cylinders placed radially, but not revolving, is becoming popular, and others have turned their attention to the further refinement of the copper-jacketed racing motor and, by thinning its walls and lengthening its stroke, have produced an engine which seems to be less thirsty for an excess of lubricating oil than its progenitor in the automobile racing field. It is hardly conceivable that out of so much activity, most of it directed by the most skilful motor designers in the old world, there should not accrue distinct gains for all motor-employing industries and all motor users, particularly automobilists.

Curtiss Flies From Albany to New York

GLENN HAMMOND CURTISS flew from Albany, N. Y., to New York City Sunday morning, making the trip of 137 miles in 2 hours and 32 minutes' flying time, or at a rate of 1 mile in 1 1-8 minutes, on an average for the flight. Mr. Curtiss in his biplane then continued the trip from the city limits to Governor's Island, completing the exhibition exactly at noon.

En route from Albany he made two stops, the first at Poughkeepsie, where he stayed for an hour, and the other at Inwood Park, which is within the limits of the metropolis, where he remained for 1 hour and 7 minutes.

The start was made at 7:03 Sunday morning under most favorable conditions, and the biplane almost at once rose to an elevation of 1,000 feet over the Hudson River and shot southward at a high rate of speed. At Poughkeepsie a perfect landing was made, 75 miles from the start. Here the supply of gasoline and oil was replenished and 1 hour later the southward course was resumed. The prize trial was concluded at Inwood Park, where further supplies of gasoline and oil were taken on board and then Curtiss gave a complimentary flight for the benefit of New York's millions by traversing the North River clear to the Battery and Governor's Island. The exact elapsed time from Albany to New York was 5 hours, lacking 3 minutes.

On the entire trip, Curtiss used seven gallons of gasoline and about two of lubricating oil.

The trip was undertaken in a successful effort to win a prize of $10,000 offered by the New York *World*. This was paid to the aviator within 3 hours after he landed. Incidentally he wins the Scientific American cup, an emblem offered to the American aviator who made the longest flights. Curtiss had already achieved two flights that exceeded those of his rivals, and the Albany-New York event clinched his ownership of the trophy.

The aviator carried a letter from the mayor of Albany to Mayor William J. Gaynor, bearing good wishes and felicitations. A special train left Albany at the same time as the aeroplane and had much difficulty in remaining in sight of the airship, so swift was the pace set.

Curtiss was elaborately received, and ever since his flight has been the center of attention. He was the guest of honor Tuesday night at a banquet given by the *World* and has been visited by many of the business, social and political leaders of this section.

In forecasting the future of the airship Curtiss told Mayor Gaynor that he believed it would be developed into fishlike form and would attain a speed of 100 miles an hour without noise, supplanting all military and naval force.

The announcement of a $30,000 prize for a flight from New York to St. Louis has been made on behalf of the New York *World* and the St. Louis *Post-Dispatch*. During the banquet tendered the aviator, Mayor Gaynor arose and said that he had been commissioned by the two newspapers to make the offer. The terms under which the award will be given have not yet been framed, but will be in the immediate future.

Oswald Motor Company Expands

SOUTH BEND, IND., May 30—The Oswald Motor Company of Goshen, Ind., has taken steps to increase the capacity of its plant. Two additions will be erected at once, one being 165 by 65 feet, two stories high; the other will be two stories high, 132 by 45 feet. Both additions will be constructed from cement blocks and from $10,000 to $15,000 will be spent for equipment and the present number of employees will be doubled. The company announces that its entire output for 1910 and 1911 has been sold.

The Greater Laporte Good Roads Association has been launched at Laporte, Ind., for the purpose of building good roads out from that city. Officers were elected and committees were appointed to look after the different phases of the work.

No 24-Hour Race for Atlanta

ATLANTA, GA., May 30.—The Atlanta Speedway Association has announced with great positiveness that it will not attempt a 24-hour race this year. Assistant Secretary "Bill" Nye went to the Brighton Beach track to see if there appeared a good chance of making a go of all-day racing at the Georgia capital. His verdict was "no." So work is going on for a local meet to be held about Midsummer. This event will be made up chiefly of amateur races, with a few contests for the local professionals. If properly worked up this event should be one of much local importance.

The local Speedway Association is working hard to get its Fall dates changed to October 27, 28 and 29 and has petitioned the A. A. A. for those dates.

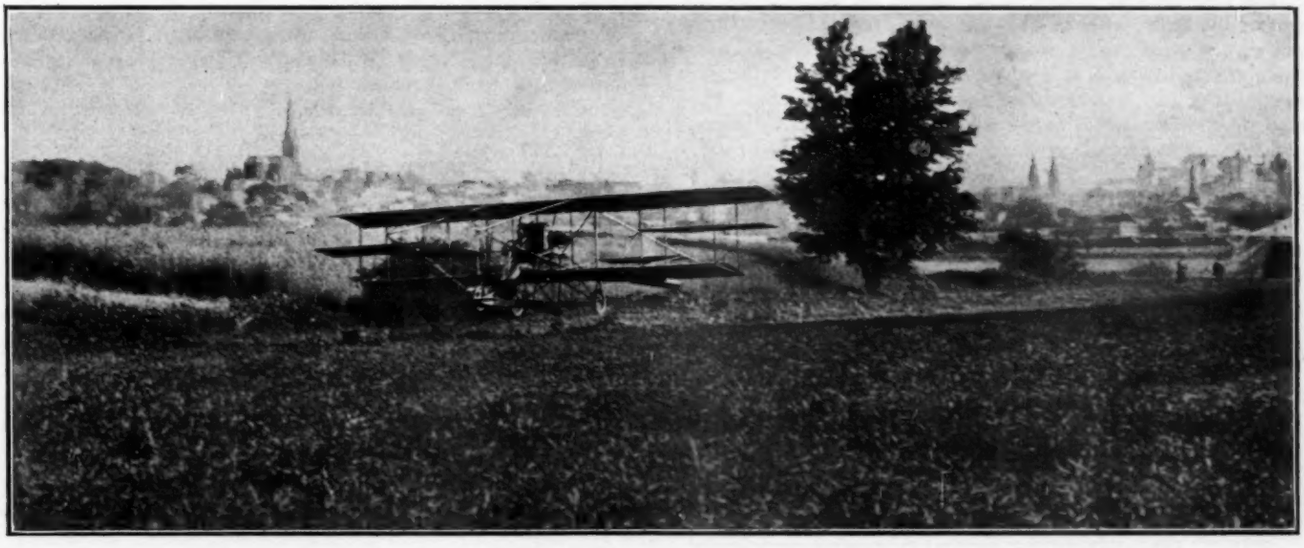


Fig. 1—As the biplane arose from its temporary halting place en route from Albany to New York.

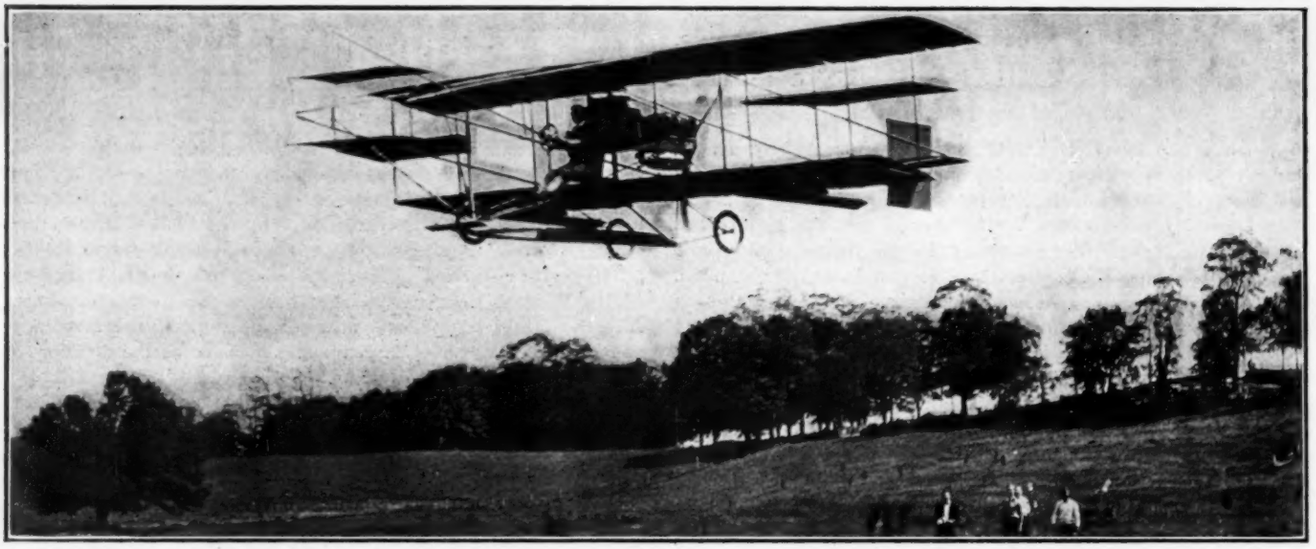


Fig. 2—Aviator Curtiss preparing to make a landing on the outskirts of the city before taking his final flight to Governor's Island

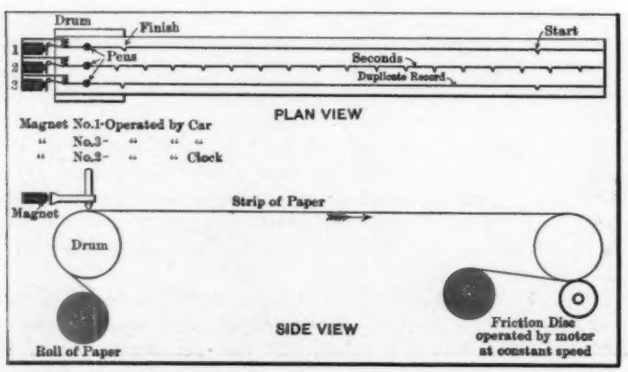
Dead Horse Hill Will Have New Timing Equipment

WORCESTER, MASS., May 30—For the first time in the history of the Dead Horse Hill climb and possibly for the first time in any similar contest, electrical timing of the cars will be made, and the new apparatus will be remarkable for its reliability and accuracy. The apparatus to be adapted for the June 4 contest is from instruments belonging to the department of mechanical engineering of the Worcester Polytechnic Institute, and will be in full charge of Prof. David I. Gallup, who will be assisted by John C. Harvey and C. D. Knights, students of "Tech."

Prof. Gallup's apparatus consists of a roll of paper on a drum driven at constant speed by a small motor and on which are indicated seconds intervals through an electrically connected clock and pendulum, and the speed of the paper is such that a second interval may be made equal in length to 4 in., which will be sufficient to determine time to one-hundredth of a second.

The instant a car passes over the line (either at the start or finish) an electric circuit will be opened by a specially devised snap switch, and this will be indicated on the moving tapes, each of which will be marked with the make of the car and its number, event number and driver, in order that the record may be kept on file.

In order to reduce to a minimum any chances of error, the system will be installed in duplicate, and connections will also be made so that the instant a car crosses the starting line and that of the finish, a series of single-blow gongs, placed at intervals up the steep course, will be rung, so that all the spectators along the course will be enabled to note the time of the car's starting and also of its crossing the finish line, at the top of the hill. The system, so far as it has been tested, indicates a mastery of a difficult situation.



Recording mechanism used in timing cars at Worcester hill climb.

Montreal to Have Aviation Week

MONTREAL, May 30—Official announcement has been made that a world's flying meet will be held at Montreal June 28 to July 4. This will be known as "Aviation Week". The meet is to be held under the auspices of the Automobile and Aero Club of Canada, and will bring together aviators from all parts of the globe, including England, France, Germany and United States.

In addition to aeroplanes, there will be balloon races of the spherical and dirigible type, parachute drops and bomb acts. Many American pilots will take part in the lighter-than-air types of aerial craft exhibitions.

120 Taxis for Orphans' Day Run

Taxicabs to the number of 105 for Orphans' Automobile Day were donated by the New York Motor Cab Owners' Association. If twenty-five more private cars are offered, no child will be left behind this year.

The constituent firms of the association who will donate the taxicabs are the New York Cab and Auto Company, New York Taxicab Company, Universal Taximeter Cab Company, Mason Seamon Transportation Company, Taxi Service Company, Renault Taxicab Company, Kayton Taxicab Company, New York Transportation Company, Haverty Taxicab Company and the Toggart Taxicab Company.

The Connecticut Cab Company already donated fifteen yellow taxicabs and these added to the 105 will make 120 taxicabs in line. This worthy effort on the part of the good citizens is gaining ground from year to year.

Walter J. Gould Meets Death on the Road

The many friends of Walter J. Gould, late assistant superintendent of the Grout Auto Manufacturing Company, of Orange, Mass., will learn with regret that he met his death May 24. The machine was being driven on the State Highway in the town of Merrimack, which is about two miles north of the village of Reed's Ferry. The chauffeur failed to observe a sharp curve ahead and the automobile was going too fast to make it; the car turned over, landing the five occupants on the hard ground with fatal results to Mr. Gould.

The other passengers were more or less severely injured, notably Charles M. Hecker and William Castner. Medical Examiner George M. Davis, of Manchester, was summoned to the scene, and worked over the injured men, but could do nothing for Mr. Gould. Mr. Gould was married and leaves a widow and son.

Busy Week in the Michigan Automobile Center

DETROIT, May 30—Following the epochal news of last week, when the United States Motor Company announced the establishing here of a division headquarters, there has been something going on all of the time.

Five new factories were announced during the week, two for Detroit, one for Wyandotte near by, one for Pontiac and the last for Mt. Clemens, about 30 miles northwest. Of the two Detroit plants, one, the Dayton Airless Tire Company, is moving here with 300 to 500 employees from Dayton, O. Col. J. C. Hooven, of Hamilton, O., is largely interested, while the following Detroiters are officers or directors: Frank C. Van Dyke, president of the Van Dyke Motor Car Company; George C. Clark, its treasurer; S. Olin Johnson, of the Penberthy Injector Company; Wilbur Brotherton, manager of the Jerome B. Rice Seed Company.

The purchase of a fifteen-acre tract of land at River Rouge, within the city limits, is said to mean that that part of the city will soon have a large plant. The automobile concern in question has a car in the city demonstrating its worth, and promises to employ some 100 men at the start, bringing most of them from their present location in Ohio.

The purchase of a seven-acre tract of land at the corner of South Saginaw street and the town line road, Pontiac, by R. F. Monroe, of the Monroe Body Company, is said to mean one more big factory for that town, although Mr. Monroe, when seen, refused to either deny or affirm the report.

At the same pushing town, the General Motors band has been organized, and Mayor Monroe was elected president. Twenty-four men came out to the first rehearsal. The object of the band is to boost Pontiac and incidentally have a good time.

Detroit is vitally interested in the question of exports to Canada, for many of the automobile plants here have Canadian branches, and if the trade would warrant it, many more would establish factories there. That this would be a wise move is shown by the Government's report for the first ten months of the fiscal year, in which the increase over the corresponding period of the previous year was shown to be from $1,123,723 to $3,055,456, a neat little raise of $1,931,733, or 172 per cent.

Many factories are already taking an active part in the plans for the Industrial Exposition, which begins June 20 and lasts until July 6. The Regal Company has invited every Regal agent in the United States to attend the exposition as its guest. The following dealers visited the Chalmers factory recently and made arrangements for their 1911 allotments: Charles S. Snyder, Snyder Automobile Company, York, Pa.; J. W. Gillis, Rochester, N. Y.; L. W. Hodgins, Columbia Garage, Spokane, Wash., and S. S. Primm, Park Automobile Company, St. Louis. On the same day, William T. Taylor, of the Taylor Motor Distributing Company, Philadelphia, visited the Warren plant, and signed up for 1,000 Warren-Detroit "30's" for 1911 delivery.

President John Anhut, of the Anhut Motor Car Company, returned from Toledo last Friday with contracts for 410 Anhut sixes, and options for 440 more. This contract was made with the Ohio Motor Sales Company, of Toledo, distributors for this make of car in Southern Ohio.

The supply of good help is much below the demand, as evidenced in the advertising columns. Just at present there seems to be an unusual demand for draftsmen to work on 1911 models. The Hupp concern is seeking assemblers and engine men; the Packard company body builders and painters; the Metzger Motor Car Company lathe hands, tool designers, other machinists and carpenters; the J. C. Wilson Body Company watchmen, body builders, sheet metal workers and painters; at the Brush Runabout plant, carpenters are in demand; as are machinists and assemblers at the E-M-F plant No. 3; also body builders at the Yeomans Body Company. More than this, several Cleveland firms are endeavoring to reduce the available supply of men by seeking help here to go to Cleveland.

All work and no play make Jack a dull boy, so the workmen are stimulated in their desires to have a good time. In the baseball line, much has been done to further a healthy rivalry between the various automobile factories, this resulting in the formation of two leagues, one being known as the Automobile League, and comprising as members the following: E-M-F, Chalmers, Anhut and Grabowsky Power Wagon Companies. In this league, L. Robert Lilly is president, Frank J. Donahue, secretary, and Thomas F. Manning treasurer. A. G. Spaulding & Bros. have denoted a handsome trophy to the winners of the pennant. The other is a six club league, the members being: Brush Runabout, K-R-I-T, Detroit Lubricator, Dodge Bros., Detroit Radiator and Jos. N. Smith Companies. The league is called the Auto Parts League, and has as its initial officers: S. E. Allo, Brush Company, president; W. R. Webb, K-R-I-T Company, vice-president. Two parks have been secured and another will be before the opening of the season on June 4. On this and each succeeding Saturday, three games are scheduled right through to the first of October, when the League will, in all probability, transfer its energies to football.

Baltimore Club Plans Big Climb

BALTIMORE, MD., May 31—Secretary H. M. Luzius of the Automobile Club of Maryland stated that there would be at least 50 cars in the Baltimore hill-climb on the Belvidere Hill, June 18. A new ruling of the committee will compel each car to carry a full load of passengers, cemmensurate with its capacity.

The timing will be by means of an electric device which will split seconds. Joel G. Nassauer is chairman of the climb committee, the other members being H. M. Luzius and Frank H. Hack, Jr.

June 15 has been selected as the date for Orphans' Day in this city. This event will not be under the auspices of the Automobile Club of Maryland as heretofore, but will be given for the benefit of the little ones by the Baltimore *News*. This paper has taken up the cause of the orphans and already its appeal to motor car owners of the city has met success. Many of them have expressed their willingness and pleasure of loaning their cars for such a purpose. The boys and girls will be taken for a jaunt through the city and suburbs and back to their homes after having a big dinner.

Automobile Notes from Louisville

LOUISVILLE, May 30—More than 200 Kentucky motorists attended the races at the Indianapolis Motor Speedway. Half of this number left Louisville Sunday morning and arrived in Indianapolis the same afternoon. The trip was made in fifty cars under the auspices of the Louisville Automobile Dealers' Association. Carl Reimers was the pacemaker on the 126-mile trip.

Roy C. Packard, an enthusiastic motorist of Pensacola, Fla., arrived in Louisville May 27 after a 1,000-mile trip.

If the plans of members of the Louisville Automobile Club are carried out, Louisville will have a magnificent floral parade on July 4. In order to stimulate interest in the event the following prizes have been offered: First prize, $100; second prize, $60; third prize, $40. No car can enter the parade unless properly decorated.

The route committee of the Louisville Automobile Club have mapped out the second annual reliability and economy contest. The run this year will be through the western section of the State and there will be three days of travel. The exact date of the contest has not been fixed.

Giant's Despair Climb Attractive

WILKES-BARRE, PA., May 30—Entry blanks for the fifth annual hill-climbing contest up the Giant's Despair course under the auspices of the Wilkes-Barre Automobile Club, which takes place on Saturday, June 11, were sent out to-day. There are to be eleven events and the prizes offered aggregate in value $2,520. The first five events are for gasoline cars varying in size and power and having a piston displacement of from 161 to 230 cubic inches to cars with a piston displacement of from 601 to 750 cubic inches.

The sixth event will be for the $1,000 Hollenback trophy, which has been won once by the Knox Automobile Company and once by the Corbin Motor Company. It has to be won three times by one entrant to become his permanent property. This event is for cars costing between $2,000 and $3,000.

The seventh event is a free-for-all gasoline cars, with a first prize of $250, a second of $100 and a third of $25.

The winner of this event will not be allowed to take part in the invitation or consolation race for all cars, with a first prize of $150 and a second of $50.

List closes at midnight, June 6. The course is now being prepared and is already in fine condition. It is to be patrolled on the day of the race by troopers of the State constabulary and special officers, and will be open for practice for the contestants on the Wednesday, Thursday and Friday before the race. The course is 6,000 feet long, and has a rise of 700 feet with one sharp elbow and the "S" turn and the grades are from 10 to 22 per cent.

The general contest committee includes J. H. Perkins, Guy W. Moore, P. S. Ridsdale, George W. Lewis and T. A. Wright.

Roads for Central New York Relay Run

ALBANY, N. Y., June 1—Chairman S. Percy Hooker, of the State Highway Commission, writes to the automobile clubs of Central New York, in substance:

"It is the purpose of the State Highway Commission not alone to construct State and county highways, but to see that the town highways are improved in accordance with the amount of traffic they are called upon to carry. Much was accomplished during the year 1909, and still better results are looked for during the present year. The improvement of all the roads in the State cannot fail to increase the values of farm lands to a marked degree.

"I have noticed in certain newspaper articles that special efforts were being made to improve the highways over which the projected relay run will be made, resulting in the neglect of other roads. This is an incorrect impression, and may have arisen from the fact that on the roads which are the cause of these comments, the improvement has been very marked as compared to any other era, and it might naturally be thought that efforts were being concentrated along certain main thoroughfares. Investigation will disclose that such is not the case. In the agreements for the expenditure of highway moneys in every town of the State, the rule was rigidly insisted upon by this department that each mile of road in each town of the State should receive the attention which its importance demands. The purpose of the Bureau of Town Highways is to see that all the town roads of the State receive due attention, and I believe that the roads in general have greatly improved.

"I should regret very much to have the impression go abroad that these roads were especially prepared for this relay run."

(Signed) S. PERCY HOOKER, Chairman.

Nashville to Have Auto Club

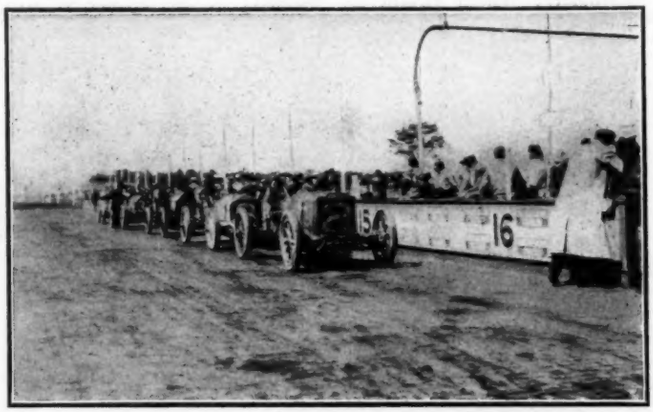
NASHVILLE, TENN., May 30—Nashville at last has a full-fledged automobile club after several ineffectual attempts. The fact that the Glidden Tour is to pass through here has awakened the auto spirit and brought about the formation of the club.

Records Fall at Indianapolis

(*Continued from*

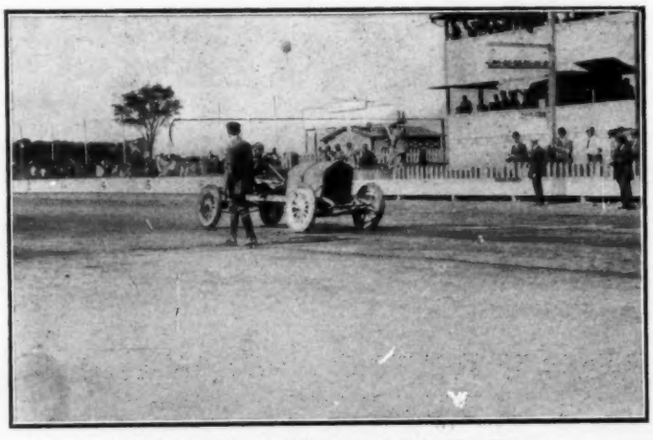
INDIANAPOLIS, IND., May 27—The Hoosiers showed they were eager for another taste of speedway racing after a winter spent in discussing the pros and cons of track surfacing, wondering whether or not the brick pavement would come up to expectations in a speed way and whether or not Indianapolis would regain the stock-car marks captured by Atlanta last fall. The results of the afternoon effectually answered these questions in the affirmative. No free-for-all marks were shattered, but in nearly every one of the class events run Indianapolis had the better of the argument with Atlanta.

The new brick surfacing proved fast, and demonstrated that it is not as rough on tires as expected, especially with the smaller cars. The shaving given the bricks by the Overland



Ready for Speed Trials at Indianapolis Speedway

testers proved most beneficial and not a single complaint was heard as to the track.



Wilcox, National, Winning 10-Mile Handicap

The 6,000 people who were in the stands came early and stayed late, and they enjoyed every bit of the racing. While the action of Referee Pardington in ruling out several cars on the ground that they did not come up to the stock car definition shot holes in the program, so to speak, the people did not complain even though these enforced scratches left but three Nationals as starters in one of the races.

Of course, the main event of the afternoon was the 100-mile race for the Prest-O-Lite trophy, won last year by the Buick, but which did not have a chance to defend its title because of Referee Pardington's ruling, which made Chevrolet and Burman sit on the side lines. The Westcott and two of the three Jacksons also came under the referee's ban. This left in the

—W. & S. Cup to Marmon

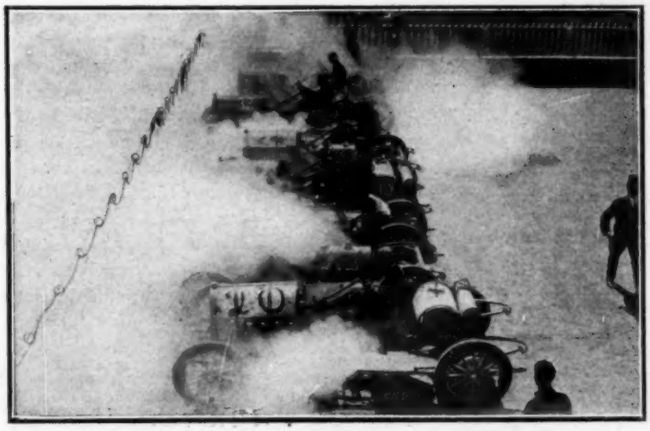
Page 991.)

field Fox in the Pope-Hartford, Aitken, Kincaid and Merz in Nationals, Lynch in a Jackson and Harroun and Dawson in Marmons. Aitken set the pace at the start, but he had plenty of competition, for the two Marmons dogged his heels continually while he was trying to shake the field. This trio formed the first group, while in grim pursuit and some little bit back were Kincaid and Merz.

The first trouble came in the sixth lap when Fox, in the Pope-Hartford, was put out of the running by a broken steering knuckle, which caused him to run off the track on the inside and break a wheel. Neither driver nor mechanic was hurt and the race proceeded. Shortly after this the Nationals began to have tire troubles, so that at the end of 20 miles Dawson's Marmon

Start of 200-Mile Event; Line Up in Front of the Judges

had assumed the lead. At this stage Kincaid, the ultimate winner, was next to last, the Jackson being the trailer. At 30 miles



Start of 10-Mile Stock Chassis Race

Harroun was the pacemaker, closely pursued by Dawson and Merz, while Kincaid was absolutely last. Harroun later lost three laps with valve-tappet trouble, and at 40 miles his team mate, Dawson, was making the running, the Nationals still fighting tire troubles. Dawson continued to pick up the odd seconds and at 60 miles he was 2 minutes 18 seconds to the good, with Merz the runner-up.

When Dawson was two laps ahead he had to stop at the pits for the first time. This was in the thirty-sixth round and an examination disclosed the same trouble experienced by Harroun—valve tappets. It sounded the death knell to the Marmons'

(*Continued on page* 1024.)

Motor News from Ohio Capital

COLUMBUS, O., May 30—Development in the rubber and tire factories of the Rubber City are coming thick and fast, and during the past week a number of additions and extensions were planned in the tire factories. Hardly a day passes but what a building of some description is planned.

The Firestone Tire and Rubber Company is planning extensive additions to its plant. Last week a contract was let to George W. Carmichael & Company for a new $500,000 plant. The building is to be completed by the beginning of 1911.

The Star Rubber Company is completing a large addition which will double the capacity of the plant. Two buildings were recently added to the plant, each of which is 100 by 50 feet, and other additions have been authorized.

The O'Neil Tire & Protector Company expects to move from its present location in a few weeks to the upper floors of the Adamson Machine Company's plant on West Exchange street.

The B. F. Goodrich Company is making extensive alterations in its plant since completing a number of large additions, and the Diamond Tire and Rubber Company is also making extensive changes. The Goodyear Tire & Rubber Company is not only erecting additions in Akron, but has also built a factory in Canada, the first American firm to build on the other side of the border.

Arrangements are being made for the annual Orphans' Day under the auspices of the Columbus Automobile Club, early in June.

Miss Blanche Stewart Scott, Vassar graduate, of Rochester, N. Y., and Miss May Lyman Phillips, of Boston, who are making the trip from New York to San Francisco in an Overland car, passed through Columbus recently on their way to Indianapolis, where they witnessed the automobile races.

The Anderson Automobile Company, of London, Ohio, was incorporated with a capital of $1,500 to operate a garage by H. Anderson, C. L. Hutchinson, J. L. Graham, George M. Hickle, I. J. Collins and John H. Keller.

The Canton Motor Car Company, of Canton, Ohio, was incorporated with a capital of $50,000 to do a general garage and sales agency business, including dealing in motor trucks, by J. E. Milner, P. E. Mooch, A. E. Mitzel, H. V. Briggle and M. W. Richards, Jr.

Howard & Wilkinson, Central Ohio agents for the Buick and Welch, have taken the agency for the Rapid Commercial car, manufactured at Pontiac, Mich.

Many Enter Dead Horse Hill Climb

WORCESTER, MASS., May 30—Preparations are being made to accommodate from 25,000 to 50,000 spectators at the annual hill climb of the Worcester Automobile Club, Saturday, June 4, on Dead Horse Hill. The contest is the biggest event of its kind in New England and always attracts an unusual amount of interest throughout that section.

Twenty-one events are carded and the entries to date include the following: Houpt-Rockwell, events 1-A, 9, 16-B, 18 and 19; Buick, event 6-A, driver, Duncan Hooker, Jr.; Buick, 10-model, event 12-B; Alco, events 15-B, 18-B, 19-B, Harry F. Grant, driver; Maxwell in 12-B, Thomas Costello, driver; Maxwell in event 6-A, Martin Doeley, driver; Babcock Electric, event 21, F. A. Babcock, driver; Warren-Detroit, events 6-A and 12-B; Model 100 Marquette, events 9 and 15-B; Fiat-150, in several events with Caleb Bragg at the wheel; Cole 30, in several events and an entry from the Oakland Motor Car Company.

C. Howard Gillette, president of the Automobile Club of Hartford, has been selected as referee.

TOLEDO, O., May 30—Frederick E. Barker, sales manager of the Willys-Overland Company, will retire from this interest on June 1. His future plans are not announced.

Interesting Items from Buffalo

BUFFALO, May 31—The Dixon Motor Car Company has made extensive alterations and improvements in its store on Main street, Buffalo. The basement of the large store has been cemented and will be used as a showroom and repair department, and an elevator, which will carry the largest makes of motor cars, has been installed. The company is planning to erect a one-story garage in the rear of the store.

The United States Auto Station Company has filed incorporation papers with the County Clerk of Erie, the capital stock being $5,000, to engage in general garage business. The principal stockholder is Frank J. Rohr, of Rochester, N. Y. The other directors are John A. VanArsdale and Warren Willett, of Buffalo.

The Pierce-Arrow Motor Car Company, the E. R. Thomas Motor Company, and F. A. Babcock, are among the contributors to the $100,000 fund being raised by the Chamber of Commerce and Manufacturers' Club for the purpose of boosting Buffalo and attracting large plants and conventions to the city.

A big motor car meet will be held at the Fort Erie, Ont., racetrack, just across the river from Buffalo, on Friday and Saturday, June 10th and 11th, under the joint auspices of the racetrack management and Buffalo interests.

The work of preparing the track for the races has already been begun.

Chairman Orson E. Yaeger, of the Contest Committee of the Automobile Club of Buffalo, has announced that the club is preparing plans for a 4- or 5-day reliability contest.

Indianapolis' First Day's Events

AMATEUR FREE-FOR-ALL, FIVE MILES

No.	Car	Driver	Time
1	National	Greiner	4:09.3
2	National	Tousey	

PREST-O-LITE TROPHY RACE, 100 MILES

1	National	Kincaid	1:23:43.12
2	National	Merz	
3	Jackson	Lynch	
4	Marmon	Dawson	
5	Marmon	Harroun	

TEN MILES, 231 TO 300 CUBIC INCHES

1	Marmon	Harroun	8:16.8
2	Marmon	Dawson	
3	Pope-Hartford	Fox	

FIVE MILES, 161 TO 230 CUBIC INCHES

1	Buick	Chevrolet	4:41.7
2	Cole	Endicott	
3	Firestone	Frayer	

TEN MILES, 451 TO 600 CUBIC INCHES

1	National	Aitken	8:25.9
2	National	Kincaid	
3	National	Wilcox	

FIVE MILES, 301 TO 450 CUBIC INCHES

1	National	Kincaid	4:05.7.
2	Marmon	Dawson	
3	Marmon	Harroun	

FREE-FOR-ALL HANDICAP, FIVE MILES

No.	Car	Driver	Hdcp.	Time
1	National	Greiner	scr.	5:44.9
2	National	Tousey	35 sec.	
3	Stoddard-Dayton	Green	scr.	

Records Fall at Indianapolis

(*Continued from*

hopes, for neither Dawson nor Harroun figured in the fight from this point on. Harroun never got past 80 miles, and at 90 miles Kincaid had the lead with Merz almost 2 minutes behind, while Lynch had worked up past Dawson. This order prevailed at the end, Kincaid winning in 83:43.12; Merz second, 85:44.15; Lynch third, 88:41.07, and Dawson fourth, 93:53.27.

The 5-mile free-for-all for the Indianapolis motor speedway helmet, a new trophy which carries with it a cash prize of $100 and a salary of $50 a week to the holder, brought out a rare field, among which were the two big Buicks with the 6 by 5 1-4-inch cylinders, which had been ruled out of the stock-chassis class; Bragg in the Fiat, Kerscher in the Darracq, Harroun in the Marmon six, Aitken in the new National 70, Kincaid in the six-60, and Lytle in the American. Young Bragg jumped the field from the pistol and had a nice lead of 50 yards going into the backstretch, with Burman in one of the Buicks following. From this point on the race was between these two and it looked as if Bragg held the whip hand. Burman did not gain much on the amateur, who came into the stretch for the last time with three lengths advantage. Then he suddenly slowed and Burman passed him like a flash, landing the helmet comfortably, the Fiat finishing second. It was said spark plug trouble put an effective brake on the Fiat. Burman's time, 3:37.24.

INDIANAPOLIS, IND., May 28—Twice raced for, it was not until to-day that a winner was evolved for the magnificent Wheeler & Schebler cup, said to be worth $10,000 and undoubtedly the most costly cup ever put up for any kind of a sporting competition. Now the first leg on the towering trophy is held by the Marmon people through the plucky efforts of Ray Harroun, of Chicago, who guided the Marmon six-cylinder Wasp 200 miles in 2 hours 46 minutes 32 seconds at an average speed of 73.05 miles an hour, defeating a rare field, which included the best cars now racing on American tracks. Nineteen cars started.

The Jackson, driven by Lynch, went the entire 200 miles without a stop of any kind, while Harroun's Marmon drew up at the pit only once and that was to take on oil and gasoline.

At the gun Arthur Chevrolet jumped out, and for the first few rounds he had a comfortable lead over the field, but Harroun, running on a schedule and as calm as if he were taking a spin on the boulevards, commenced to creep up yard by yard until at the 10-mile post he only was 4 seconds behind the leader At 15 miles he decided it was time to play his hand and at the tape he shot by the 16 B Buick and took the lead. From that point on he never was headed and at no time was he in danger of letting go his hold on the pacemaking position.

At the half century the order was Harroun, A. Chevrolet and Fox in the Pope. From this time on there wasn't much to vary the monotony of the long grind, and when the finish came it showed Harroun two laps to the good, with the other finishers, Lynch, Aitken and Chevrolet, in the order named.

Summary of the 200-mile race for the Wheeler & Schebler Cup.

No.	CAR	Driver	10 Miles	20 Miles	30 Miles	40 Miles	50 Miles	60 Miles	70 Miles	80 Miles	90 Miles	100 Miles	110 Miles	120 Miles	130 Miles	140 Miles	150 Miles	160 Miles	170 Miles	180 Miles	190 Miles	200 Miles
32	MARMON	Harroun	8:18	16:03	23:51	31:38	39:27	47:25	55:30	*63:26	71:33	79:33	89:25	97:18	115:30	113:57	122:16	130:54	139:31	148:18	157:09	166:32
16	JACKSON	Lynch	9:23	18:07	26:52	35:32	44:09	52:45	61:15	69:47	75:18	86:44	95:13	113:43	112:08	120:30	128:54	137:27	145:53	154:31	163:13	171:48
7	NATIONAL 40	Aitken	8:40	16:58	30:01	38:35	47:05	55:32	63:59	72:31	82:55	91:20	99:40	107:56	116:12	124:25	132:38	140:49	148:45	156:36	164:27	173:28
44	BUICK 16B	A. Chevrolet	9:02	17:07	26:47	35:08	43:31	51:43	60:10	69:55	78:26	86:58	95:21	103:50	112:04	120:22	128:49	137:17	148:52	157:09	165:25	173:49
3	POPE-HARTF'D.	Fox	9:05	17:42	26:24	35:06	43:57	52:43	61:26	72:41	81:34	90:33	99:24	107:58	116:19	124:41	133:07	141:34	153:05	161:29	170:00	78 laps
46	KNOX SIX	Oldfield	9:01	17:45	26:25	40:19	48:58	57:05	66:35	75:30	84:20	93:20	102:13	110:49	119:14	127:35	135:59	148:18	156:30	164:34	77 laps	
47	NATIONAL 40	Kerscher	8:49	17:21	25:54	38:38	54:01	62:31	70:49	79:12	90:21	98:42	107:02	115:23	123:44	132:07	140:28	148:50	155:05	153:02	171:38	77 laps
11	NATIONAL 40	Merz	9:04	19:09	29:14	37:53	49:18	58:06	66:54	75:36	84:24	93:11	104:16	113:10	122:05	130:53	139:45	148:34	157:19	166:07	174:51	76 laps
22	CUTTING	Clarke	9:26	19:06	28:13	37:32	46:44	55:48	64:49	73:50	82:49	91:49	100:48	109:46	118:39	127:34	136:31	145:24	154:16	163:04	76 laps	
18	JACKSON	Ellis	9:02	18:16	27:17	36:25	45:25	54:27	63:34	72:43	81:46	90:57	99:55	109:03	118:13	127:14	136:25	145:24	154:16	173:05	75 laps	
20	CUTTING	Bisbee	9:39	21:28	30:53	40:15	52:54	65:17	74:48	84:07	93:21	102:44	112:28	122:31	132:47	143:06	153:36	164:21	175:08	68 laps		
41	BUICK 100	Burman	8:14	16:12	24:21	38:08	48:10	60:03	68:47	77:09	85:38	95:10	103:52	113:06	133:10	142:01	154:37					
31	MARMON 32	Keene	9:46	19:18	28:45	68:19	97:46	107:20	116:13	124:30	133:46	145:47	154:30	153:12	171:51	Runni	ng at	finish				
17	JACKSON	Schwitzer	22:59	48:60	58:05	67:03	76:03	85:05	94:02	102:52	111:47	123:06	131:59	140:53	156:27	Out at	52 laps					
21	CUTTING	Gelnaw	9:48	19:04	28:13	37:35	47:05	58:26	67:42	77:09	86:38	96:13	107:48	117:52	Out at	50	laps					
42	BUICK 100	L. Chevrolet	8:27	20:10	28:51	37:33	48:10	58:26	66:46	75:08												
12	WESTCOTT	Endicott	9:48	19:23	28:54	38:33	48:17	63:26														
30	MARMON 32	Dawson	8:58	17:28	25:53	34:03																
10	NATIONAL 40	Kincaid	8:22	19:15	27:40	36:08	46:15															

*All readings are in minutes and seconds.

—W. & S. Cup to Marmon

(page 1023.)

INDIANAPOLIS, May 30.—To-day's events, which were witnessed by 60,000 spectators, were characterized by the breaking of one Speedway record in the mile and kilometer trials, Barney Oldfield, in his 200-horsepower Benz, covering the kilometer in 21.45 seconds, the previous mark being 25.13 made by Caleb Bragg in the 90 Fiat at Los Angeles. In the mile trials Oldfield established a new American speedway record of 35.63 which was under his mark of 36.22 made on the Los Angeles motordome.

In the 160-230 class at 10 miles, Chevrolet with his model 10 Buick set a new mark of 9:03.60, the old figures being 9:49.46. In the 301-450 class, 10 miles, John Aitken in a National 40 went the distance in 7:57.08; former best, 8:08.98. Oldfield broke another record with his Knox Six in the 5-mile event, 451-600 class, going the distance in 4:01.36; former mark of 4:03.24.

Summary of Events of Second Day

TIME TRIALS, 1 MILE FLYING START

No.	Car	Driver	Time
1	Empire	Motsinger	107.03 seconds
2	American	Lytle	44.44 "
8	National	Aitken	46.37 "
14	Fiat	Bragg	41.03 "
32	Marmon	Harroun	42.37 "
54	Darracq	Kerscher	41.83 "

10 MILES STOCK CHASSIS, 301-450 CUBIC INCHES

No.	Car	Driver	5 miles	10 miles
10	National	Kincaid	4:12.15	8:12.02
9	National	Aitken	4:12.40	8:08.98
30	Marmon	Harroun	4:12.62	8:09.06
11	National	Merz	4:13.05	8:10.14
16	Jackson	Lynch	4:29.37	8:43.81

5 MILES STOCK CHASSIS, 451-600 CUBIC INCHES

No.	Car	Driver	2½ Miles	5 Miles
46	Knox	Oldfield	2:09.92	4:03.24
11	National	Herr	2:10.42	4:04.54
9	National	Aitken	2:10.84	4:04.30

CLASS D FREE-FOR-ALL HANDICAP, 10 MILES

No.	Car	Driver	Handicap Time	Handicap	Actu'l Run'g Time
11	National	Wilcox	7:15.33	:50	7:16.33
16	Jackson	Lynch	7:18.03	1:25	8:43.03
22	Cutting	Clarke	7:19.00	1:25	8:44
25	Marion	Anderson	7:30.10	1:25	8:55.10
48	National	Greiner	7:34.40	:30	8:04.40
3	Pope-Hartford	Fox	7:35.70	1:00	8:35.70
8	National	Aitken	7:40.72	:25	8:05.72
47	National	Tousey	7:41.14	:50	7:41.64
28	Hereschoff	Gelnaw	7:46.95	2:40	10:26.95
4	Firestone	Frayer	7:52.17	2:20	10:12.17
24	Marion	Tinkler	7:57.53	1:45	7:58.98
27	Hupmobile	.....	8:06.96	3:40	11:46.96
46	Knox	Oldfield	8:14.65	scratch	8:14.65
5	Cole	Edmunds	8:18.93	2:20	10:36.93
18	Jackson	Ellis	8:19.12	1:25	9:44.12
26	Warren-Detroit	Miller	8:19.85	2:20	10:39.85
21	Cutting	Bisbee	8:26.91	1:40	10:06.91
12	Westcott	Endicott	8:32.86	1:25	9:57.86
1	Empire	Motsinger	8:36.32	2:40	11:16.32
2	American	Lytle	accident	:25	.....

Summary of Third Day Events

50-MILE STOCK CHASSIS, CLASS B, 231-300 CUBIC INCHES

No.	Car	Driver	10 mi.	20 mi.	30 mi.	40 mi.	50 mi.
33	Marmon	Harroun	8:55.76	17:30.92	26:06.11	34:25.47	42:41.83
34	Marmon	Dawson	9:03.12	17:38.30	26:09.77	34:32.26	42:43.09
3	Pope-Hartford	Fox	8:55.96	17:32.13	26:08.65	34:36.94	43:11.05
29	Great Western	Kincaid	9:40.93	18:40.52	27:42.37	36:43.35	45:47.36
25	Marion	Anderson	9:29.26	18:43.11	27:49.33	36:52.18	45:57.27
26	Warren-Detroit	Miller	10:37.88	20:53.75	33:04.03	43:13.57	17 laps
15	Jackson	Scheifler	13:20.22	22:16.52	31:20.99	made 13 laps	
20	Cutting	Clarke	27:49.91	36:56.36	46:15.02	made 12 laps	

FIVE-MILE CHAMPIONSHIP, 231 TO 300 CUBIC INCHES

No.	Car	Driver	Time
1	Marmon	Dawson	4:41.33
2	Marmon	Harroun	4:41.36
3	Marion	Anderson	4:50.59

TEN-MILE CHAMPIONSHIP, 161 TO 230 CUBIC INCHES

1	Buick	L. Chevrolet	9:03.60
2	Buick	Burman	9:14.86
3	Firestone	Frayer	10:32.46

TEN-MILE CHAMPIONSHIP, 231 TO 300 CUBIC INCHES

1	Marmon	Harroun	9:25.31
2	Marmon	Dawson	9:25.34
3	Cutting	Clark	9:25.57

FIVE-MILE CHAMPIONSHIP, 451 TO 600 CUBIC INCHES

1	Knox	Oldfield	4:01.36
2	National	Aitkin	4:01.92
3	National	Kincaid	4:02.23

Automobile Activity Around Boston

BOSTON, May 30—Judging by the manner in which the owners of private cars are responding to the call sent out by Chester I. Campbell, of the Boston Automobile Dealers' Association, for machines to take the blind and crippled children on an outing June 8, the affair will be a big success. In addition to cars some people have sent checks to Mr. Campbell so that he may hire additional machines. The Boston Automobile Dealers' Association has given $150 and members of the Association will supply about 50 machines. It is expected that more than 200 cars will be used on the outing and sports have been arranged for the drivers of machines under the direction of Thomas J. Burke, a famous athlete, who represented America at the Olympic games.

Four garages in Cambridge, just across the river from Boston, were sold last week to motor dealers in Boston and a fifth is now under consideration. They were erected some time ago by a real estate dealer, and were speedily occupied. E. D. Dodge Motor Company, Boston representatives of the Pope-Hartford and Waverley electrics, bought two buildings with 20,000 square feet of land, all assessed for $43,000. A. P. Underhill Company, Knox agents, bought one with 10,000 feet of land for $18,000, and a fourth was sold to A. C. Plummer, who represented a motor company at present not ready to move there. The price was $16,500. The Whitten-Gilmore company are negotiating for another of the buildings which they occupy at present. They are all one-story buildings built purposely for garage and repair work and minus posts.

J. W. Maguire, Boston agent for the Pierce-Arrow, is looking about for a place on which to build a new garage and repair shop, having outgrown his old quarters on Harcourt street.

Plans are under way to have a number of the Bay State A. A. members resume their annual outings to Rye Beach, N. H., where they formerly went early in the summer each year. The date planned is June 17, a holiday in Massachusetts, which comes this year on Friday, allowing a run of at least three days.

The Haynes car is again represented in Boston after a lapse of nearly a year. George H. Hudson, of the Hudson-Colby Company, agents for the Herreshoff, has taken the agency, having Eastern Massachusetts for his territory. C. S. Henshaw, now manager of the Boston branch of the Thomas, formerly handled the Haynes in the Hub.

FIVE-MILE CHAMPIONSHIP, 301 TO 450 CUBIC INCHES

1—National	Aitken	4:06.69
2—National	Kincaid	4:06.73
3—National	Merz	4:07.06

TEN-MILE CHAMPIONSHIP, 451 TO 600 CUBIC INCHES

1—Knox	Oldfield	7:50.75
2—National	Wilcox	7:59.83
3—National	Kincaid	8:00.05

TEN-MILE CHAMPIONSHIP, 301 TO 450 CUBIC INCHES

1—National	Aitken	7:57.08
2—National	Kincaid	7:57.56
3—National	Merz	7:57.61

FREE-FOR-ALL, TEN MILES

1—Fiat	Bragg	7:21.95
2—National	Kincaid	8:01.31
3—National	Greiner	8:26.87

FREE-FOR-ALL, FIVE MILES

1—Fiat	Bragg	3:34.03
2—Darracq	Kirschner	3:43.67
3—National	Aitken	4:05.13

FREE-FOR-ALL, HANDICAP, FIVE MILES

		Hdcp.	
1—Stoddard-Dayton	Reed	54 sec.	3:38.65
2—National	Tousey	54 sec.	3:54.54
3—National	Aitken	27 sec.	3:56.86

FREE-FOR-ALL, TEN MILES

1—Fiat	Bragg	7:02.68
2—Darracq	Kirschner	7:04.30
3—National	Aitken	7:39.18

TIME TRIALS

		Kilo.	Mile
Benz	Oldfield	.....	35:63
Benz	Oldfield	21:45	37:1

Suits Settled: Reorganization Coming

TOLEDO, OHIO, May 30—Suits filed against J. N. Willys and the Willys-Overland Company at Indianapolis last Monday have been amicably adjusted and will be withdrawn without further trouble. Two suits were filed, one by P. C. Forbes of Indianapolis, in the County Court, alleging that Willys is a resident of that city, and the other, by Henry F. Campbell, in the Federal Court, claiming that the defendant is a resident of Toledo. Injunctions and an accounting were demanded.

President Willys stated that the difficulty arose because of disgruntled stockholders who have not been in sympathy with the business policy of the concern, and who had offered to dispose of their stock to him for $2,000,000. "This proposition I flatly refused," he said.

"Their actual investment with me was $40,000 and I told them I would not stand to be held up. I offered them $450,000 for their stock in the sales company, but they declined to accept this. I finally compromised rather than engage in prolonged litigation. I now own all but 243 shares of the 20,200 shares of the different companies. These 243 shares are in the possession of the men who are working with me in the company in Toledo.

"I am going to reorganize all the companies into the Willys-Overland of Toledo. The capital of this company is now $2,000,000, of which $1,200,000 has been issued. The other $800,000 is to be issued to the Overland Automobile Co., of Indianapolis, and when that is done, the latter concern will be turned over to the Toledo company, making but one corporation with a capital of $2,000,000, with $100 as the par value of each share."

The Ohio Motor Sales Co., of Toledo, was this week incorporated with a capital of $10,000. The new concern will have the local sales agency for the complete line of Hupmobile cars. Rooms have been secured just off Madison avenue on Erie street, and the place is now being remodeled and put in shape for occupancy within ten days. C. J. Osborn will have charge of the business. William Pratt will be assistant manager.

Amateur Hill Climb in Westchester

(*Continued from page 994.*)

Summaries of the Races

EVENT NO. 1—CLASS C, SUBDIVISION 1-2-3. OPEN TO CARS WITH PISTON DISPLACEMENT TO AND INCLUDING 300 CUBIC INCHES

No.	Car	Driver	1st Try	2nd Try
21	S. P. O.	Thomas N. Cook	1.19 1-5	1.16 1-5
22	E-M-F	H. C. Sierck	1.23 1-5	1.23 4-5
23	Chalmers	A. W. Page, M.D.	1.33 3-5	1.32
24	Chalmers	W. M. Quimby	1.29 4-5	1.29
25	Lancia	C. M. Chauncey	1.25 1-5	1.24 2-5
26	Lancia	J. G. Wilson	1.32 2-5	1.32
27	Lancia	A. E. Gallatin	1.28 1-5	1.25 2-5
30	Premier	J. Thompson	1.34 2-5	1.31 1-5

EVENT NO. 2—CLASS C, SUBDIVISION 4. OPEN TO CARS WITH PISTON DISPLACEMENT OF 301 TO 450 CU. IN.

No.	Car	Driver	1st Try	2nd Try
41	Speedwell	H. A. Weatherbee	1.13 2-5	1.12
42	Rainier	P. G. Grant	1.16	1.20 2-5
43	National	J. M. Rutherford	1.05 2-5	1.05 2-5
46	Cleveland	R. M. Jesup	1.23	1.20 3-5
47	Buick	C. H. Jackson	1.13	1.10
48	National	C. D. Goddard	1.21 2-5	1.18

EVENT NO. 3—CLASS C, SUBDIVISION 5. OPEN TO CARS WITH PISTON DISPLACEMENT OF 451 TO 600 CU. IN.

No.	Car	Driver	1st Try	2nd Try
52	Locomobile	J. R. Johnson	1.32 4-5	1.21 2-5
55	Mercedes	S. E. Wishart	1.07 4-5	1.05
56	Simplex	G. W. Quintard, 3rd	1.06 1-5	1.05 1-5
57	Stearns	J. D. Tooker	1.15 1-5	1.13 2-5
58	Simplex	C. A. Fowler, Jr.	1.35 4-5	1.14 1-5
59	Palmer-Singer	N. Fowler	1.22	1.17 2-5

EVENT NO. 4—FREE-FOR-ALL, CLASS D. ONE TRIAL ONLY

No.	Car	Driver	1st Try
26	Lancia	J. G. Wilson	1.44 1-5
42	Rainier	P. G. Grant	1.24 3-5
43	National	J. M. Rutherford	1.06
46	Cleveland	R. M. Jesup	1.22 2-5
55	Mercedes	S. E. Wishart	1.04 1-5
56	Simplex 50	G. W. Quintard, 3rd	1.04 3-5
57	Stearns	J. D. Tooker	1.11 1-5
59	Palmer-Singer	N. Fowler	1.16 4-5
61	Simplex 90	G. B. Lambert	1.03
52	Locomobile	J. R. Johnson	1.37

EVENT NO. 5—OPEN TO MOTORCYCLE POLICE

No.	Officer	Cycle	Force	Time
P2	Munro	Indian	Harrison	1.21 4-5
P3	Ball	Indian	Rye	1.16 2-5
P5	Shay	Curtis	White Plains	1.26
P7	Ruggiero	Indian	Scarsdale	1.07 1-5

Sheridan Hill Climb—Ingenious Handicapping Rules

(*Continued from page 993.*)

The conditions under which the hill climb was conducted were ideal. The weather was perfect and the hill itself could not have been further improved for the occasion. A large crowd of enthusiasts and interested persons from Fredonia, Brockton, Dunkirk, Forestville and other towns was on hand to witness the contest, while a large party of Buffalonians formed part of the line of spectators on either side of the road.

The system of scoring was so different from the method used ordinarily that it was the subject of general comment. The opinion among the officials who had charge of the event seemed to be that the alteration of some detail in the matter of crediting the contestants on the various sections of the hill might bring about still more equitable conditions as far as the larger cars were concerned. But on the whole, the working of the plan in an event where classification was not resorted to, is considered most auspicious for a beginning of such a revolutionary move.

The extreme steepness of the hill resulted in numerous spectacular features during the climb, and the whole affair may be put down as satisfactory from the viewpoint of the spectator; fairness to the entrants and as a thorough test of the climbing ability of the cars and their general utility in traversing heavy grades under normal and extraordinary conditions.

Points Made Against Cars Under New Plan

NAME OF CAR	H.P.	Cylinder Bore	Piston Stroke	Car Model	Entrant	Driver	Cylinder Volume	Time First Contest Seconds	Points First Contest	Points Second Contest	Final
Ford	20	3 3/4	4	20	A. Getlen	O. F. Fay	176.7	75 1/5	13,641.24	5,750.0	7,891.24
Marion	35	4 1/2	4 1/2	Roadster	Mulholland Co.	F. C. Carter	255.3	70	17,871.00	5,750.0	12,121.00
Buick	18	3 3/4	3 3/4	10	David Goldsmith	David Goldsmith	165.7	86 1/5	14,283.34	1,880.0	12,403.34
Pullman	30	4 1/2	5	O Touring	A. P. Sloan	A. E. Mesler	255.8	75	19,185.00	5,750.0	13,435.00
Overland	40	4 1/2	4 1/2	42	Mulholland Co.	F. J. McDonald	255.3	73	18,848.90	3,660.0	14,188.90
Oakland	30	4	4	30	N. B. Healy	P. K. Johnson	318.1	65 1/2	20,835.55	5,750.0	15,085.55
Buick	30	4 1/2	5	17	Skinner & Nichols	W. T. Nichols	318.1	69	21,948.90	5,750.0	16,198.90
Pullman	35	4 1/2	4 3/4	K Touring	A. P. Sloan	Robert Weikum	302.2	74	22,362.80	5,750.0	16,612.80
Overland	42	4 1/4	4 1/2	48	Mulholland Co.	M. Dodds	198.8	72	18,381.60	940.5	17,441.10
Cadillac	30	4 1/4	4 1/2	Touring	O. F. Fay	O. F. Fay	255.3	97	24,764.10	932.5	23,831.60
Thomas*	40	4 1/4	4 1/2	Flyer	R. MacDonald	R. MacDonald	468.3	68 3/5	32,125.38	5,750.0	26,375.38
E. M. F.	30	4 1/2	4 1/2	30	Edmunds & Son	E. Edmunds	226.2	83 2/5	18,865.08	524	18,341.08
Thomas*	40	4 1/4	4 1/2	Flyer	R. MacDonald	R. MacDonald*	468.3	68 3/5	32,125.38	5,750.0	26,375.38

*R. MacDonald drove two Thomas cars of same style, making same score with each.

U. S. Motor Company Absorbs Stoddard-Dayton

DETROIT, May 30—With the news given out here on Saturday last of the absorption of the Dayton Motor Car Company of Dayton, O., by the United States Motor Company, it was also stated that the plans of the latter were complete, and that from now on attention would be paid entirely to the work of getting out cars for next year, for which the plans are unusually ambitious.

The latest company to be absorbed, the Dayton Motor Car Company, is a very large and flourishing one as the estimate of its worth, $2,500,000, will go to show; as well, also, the output for the current year, namely 8,000 cars, ranging in price from $1,500 to $3,500; while this firm also controls the Courier Company (which is included in the sale to U. S. Motor Company), the latter turning out 1.500 Courier cars.

Now, that the organization is complete, the roster shows that it comprises a total of sixteen plants, now built or building. These are: Maxwell-Briscoe Company, five; two at Providence, two at Tarrytown, one at Newcastle; Dayton Motor Car Company, three; two Stoddard-Dayton, and one Courier at Dayton; Brush Runabout Company, two, both in Detroit; Briscoe Mfg. Co., two; one in Detroit, and one in Newark, N. J.; Alden-Sampson Mfg. Co., two; one in Pittsfield, Mass., and one just started in Detroit; Columbia Motor Car Company, one in Hartford, Conn.; Gray Motor Company, one in Detroit.

These sixteen plants now employ 12,500 men, which will be increased to nearly 17,000 for 1911. This large number of employees will be needed to care for the enormous production, relative to which Benjamin Briscoe, the head of the enterprise, is quoted as follows:

"We expect to produce between 50,000 and 60,000 cars for 1911, or a total business of approximately $55,000,000, the employees at the Columbia plant being doubled, those at the Dayton works being increased to such a number as will enable us to double the number of Courier cars now turned out, while all the other factories will be correspondingly increased."

The new Detroit plant for the Alden-Sampson Mfg. Co., which will be the real headquarters of the power wagon end of the United States Motor Company, will consist of one long narrow single story building of reinforced concrete construction, with a smaller separate office building. The main shop building will be 1,000 ft. long by 175 ft. wide. Commenting on the Detroit situation, Frank Briscoe said:

"In the various Detroit plants we will employ over 6,000 men by the first of the year, we are going to build a great big addition to the Brush plant on Oakland avenue that will be shaped like a letter U. Each leg of this will be 1,050 ft. long and the connecting link 450 ft. long, the whole structure being 152 ft. wide, one story in height and of the saw-tooth roof construction, which gives the maximum amount of interior light and convenience for all phases of manufacturing."

Sentinel Trophy Route Selected

MILWAUKEE, May 30—Contestants in the first annual Wisconsin tour for the Milwaukee *Sentinel* trophy, under auspices of the Wisconsin State Automobile Association, will travel one of the most difficult routes ever laid out for a motor tour, according to M. C. Moore, president of the W. S. A. A., who has just returned from the pathfinding tour in a Rambler.

It took Mr. Moore seven days to blaze the trail for the five-day tour. Difficulties encountered at this time, however, will not be faced by the contestants, because the pathfinding was done in May and the tour will be run July 18 to 23, inclusive. The roads which were in poor condition when the pathfinder passed will be entirely different for the tour.

The longest run will be on the fourth day, when 210 miles will be covered from Chippewa Falls to Appleton. The first night control will be Madison; the second, LaCrosse; the third, Eau Claire-Chippewa Falls; the fourth, Appleton, returning to Milwaukee on the fifth day. A schedule of twenty miles an hour will be maintained. Mr. Moore will act as pilot.

The Wisconsin Motor Manufacturing Co., of North Milwaukee, Wis., has increased its capital stock from $100,000 to $200,000.

The Franklin Automobile Co., of Milwaukee, Wis., has filed an amendment to its articles of incorporation changing the name to Franklin Auto & Supply Co. Henry Danischefsky is president of the company. The headquarters are at 321 Fourth Street, Milwaukee. This concern has just taken the agency for the Chase motor truck and has handled the Franklin, Regal, and Babcock electric.

Phillip Kellar, of Kaukauna, Wis., has been granted letters patent on a new type of safety brake for use on motor cars in place of the emergency brake. The appliance consists of two steel shoes which drop to the ground instantly when released, lifting the rear wheels from the ground and compelling the car to slide on the shoes.

The Abresch-Cramer Auto Truck Co., of Milwaukee, Wis., has moved into new and larger quarters in a five-story reinforced concrete structure.

Clubmen Finance Road Repair

RICHMOND, VA., May 30—The Richmond Automobile Club, through a committee composed of Dr. Angus Nichols, R. B. Alport and E. C. Pelouse, donated $600 to the road supervisors of Chesterfield County, Va., for use in completing the road improvements between Petersburg and this city.

The macadamizing of the thoroughfare has been completed all but about three miles, and the donation is to be used for this stretch.

Members of the club state that they would have given a larger amount, but they recently became discouraged by the frequency of arrests for alleged violations of the speed laws, made by county authorities. It is understood that the rulings of the authorities are to be modified.

Quite a number of motorists here met the advance cars in the Washington *Post* Test Run when they arrived to-day, and the Richmond Automobile Club turned out with a car bearing the club officials. The contestants were welcomed to the city, and entertained for some time before the return trip to Washington.

Clubmen Work Hard on Roads

SIOUX FALLS, S. D., May 30—Automobile owners of Pierpont, Day County, S. D., have demonstrated what can be accomplished by a practical good roads campaign. Every morning for the past two weeks a big delegation of autoists left Pierpont in autos for the country roads which lead to the town, equipped with picks, crowbars and shovels. As a result the little town of Pierpont is approached by one of the finest road systems in the country and one that is bringing this section much notice throughout motordom of the adjoining States.

The Beloit (Wis.) Automobile Club plans to hold its first annual sociability tour of two days in June. It is planned to run to Janesville, Jefferson, Watertown, Waupun, Waukesha and Milwaukee on the first day, returning via Racine, Kenosha, Geneva, Delavan and Janesville on the second day.

Good Roads Tour Offers Great Promise

WITH a Columbia, Gordon M. Wagner will be pacemaker for National Good Roads tour, starting from Atlanta June 6 and finishing at New York June 14. With the mails of Tuesday and Wednesday still to be accounted, the entry list now contains sixty-two contesting and eight official cars. The entry box closed June 1. The list is as follows:

OFFICIAL CARS (NON-CONTESTING)

Entrant's Name and Address	Make of Car
James R. Gray, Atlanta	Pierce Arrow
Major John S. Cohen, Atlanta	White Gasoline Car
R. H. Johnston, the White Company, New York	White Steamer
Matheson Automobile Company, New York	Matheson "Silent Six"
Ray M. Owen, for R. M. Owen & Co., New York	Reo Roadster
Columbia Motor Car Company, New York	Columbia
A. D. Corwin, Buick Motor Company, New York	Welch-Detroit
Ajax-Grieb Rubber Company, New York	Lozier (Briarcliff model)

CONTESTING ENTRANTS

Entrant's Name and Address	Make of Car
Beaumont Davidson, Atlanta	Packard
W. J. Stoddard, Atlanta	National
Colonel J. J. Woodside, Atlanta	Thomas
R. E. O'Donnelley, Atlanta	Packard
Joseph F. Gatins, Jr., Atlanta	Knox
Edward M. Durant, Atlanta	Pope-Toledo
W. S. McNeil, Jr., Atlanta	Lambert
Regal Motor Car Company, Detroit, Mich.	Regal
W. T. McNinch, Atlanta	Lambert
Atlanta Motor Car Company, Atlanta	White Star
Jackson P. Dick, Atlanta	American Traveller
Maxwell-Briscoe Motor Company, New York	Maxwell Touring Car
Edward H. Inman, Atlanta	Simplex
C. W. Dupre, Marietta, Ga.	Maxwell
Charles I. Ryan, Atlanta	Columbia
W. E. Wimpy, Atlanta	Buick
J. H. Marsteller, Roanoke, Va.	Chalmers-Detroit
Forest Adair, Atlanta	Stevens-Duryea
E. M. Willingham, Atlanta	Ford
N. W. Wallace, Charlotte, N. C.	Hupmobile
P. S. Arkwright, Atlanta	Pope-Hartford
A. Burwell, Jr., Charlotte, N. C.	Firestone-Columbus
Brush Automobile Company, Atlanta	Brush
Kelly-Knight Motor Car Company, Atlanta	Kissel-Kar
Arthur T. Smart, Atlanta	Speedwell
Georgia Motor Car Company, Atlanta	E-M-F
Mrs. Elizabeth A. de Giers, New York	Thomas
E. D. Crane & Co., Atlanta	Firestone-Columbus
W. D. Alexander, Atlanta	Stoddard-Dayton
Asa G. Candler, Jr., Atlanta	Lozier
Maxwell-Briscoe Company, Tarrytown, N. Y.	"Baby" Maxwell
John W. Grant, Atlanta	Locomobile
E. D. Crane & Co., Atlanta	Hupmobile
T. H. Cooper, Salem, Va.	Corbin
C. H. Johnson, Atlanta	Stevens-Duryea
Georgia Commission Company, Albany, Ga.	Halladay
John Moore & Co., New York	Brush
Herman J. Haas, Atlanta	Winton Six
J. E. Brown, Atlanta	Selden
S. M. Smith, Bluefield, W. Va.	Speedwell
Dr. E. C. Seawright, Fayetteville, Ga.	Ford
C. D. Smith, Albany, Ga.	Jackson
Julian H. Reynolds, Augusta, Ga.	Maxwell
L. S. Brown, Athens, Ga.	Mitchell
Roy Collier, Atlanta	Thomas
Mercer Automobile Co., Trenton, N. J.	Mercer
W. G. Humphrey, Atlanta	Pullman
Ohio Motor Car Company, Cincinnati, Ohio	Ohio
Pullman Motor Car Company, York, Pa.	Pullman
Carter & Logan Brothers, Savannah, Ga.	Cole
A. P. Herrington, Atlanta	Reo
Robert Campbell, Cedartown, Ga.	Oakland
D. K. McColl, Bennettsville, S. C.	Cadillac
J. L. Henderson, Hampton, Ga.	Stevens-Duryea
M. L. Thrower, Atlanta	Ohio
Marcellus Rambo, Birmingham, Ala.	Columbia
Good Roads Committee, Winston-Salem, N. C.	Buick
R. D. Apperson, Lynchburg, Va.	Palmer-Singer
R. G. Scruggs, Waycross, Ga.	E-M-F
W. P. Walthall, Atlanta	Moon
Mayor Gaston Gunter, Montgomery, Ala.	White Gasoline Car
W. H. Peacock, Cochran, Ga.	Cadillac

Asks Court to Withdraw Reward

WILMINGTON, DEL., May 30—If the Delaware Automobile Association can induce the Levy Court of New Castle County to withdraw a standing reward offered by the court some time ago, of $15 for the arrest and conviction of automobile drivers who exceed the speed limit, it is the belief of the officers of the association that its new plan for enforcing the law can be made successful.

The association took the matter up with the Levy Court at its last meeting, requesting a withdrawal of the reward, temporarily at least, on the ground that it is an incentive to activity on the part of unscrupulous officers and others who might be guilty of persecution, in order that the association may carry out its policy of dealing with offenders in an orderly and systematic manner.

Some time ago the Levy Court agreed to share with the association, to the extent of $150, the expense of tripping up and punishing speeders, and under this agreement the association has mapped out measured stretches in several different parts of the county, the locations known only to the association officers, and there are watchers, who are also unknown, except to the officers. These watchers have reported a number of violations and the violators are receiving warning notices, and if they do not heed these they will be prosecuted. The plan is working well, but there is an indication of its being interfered with by the standing reward.

The Levy Court has taken the matter under advisement and will probably give an answer next week.

Callan Bill Signed by Hughes

ALBANY, N. Y., June 1—Governor Hughes signed the Callan bill yesterday. The bill provides registration of automobiles and licensing of chauffeurs, and it is estimated that the revenue to be derived from its operation will be in the neighborhood of $1,500,000 annually. The new law goes into effect August 1.

Hoosier Automobile Items

INDIANAPOLIS, IND., May 30—A receiver has been appointed for the Indiana Motor and Manufacturing Company, which has its principal offices in this city and its factory in Franklin. The Security Trust Company has been named as receiver. William H. Freeman, a stockholder, claims indebtedness of $750.

Inability to get parts to complete several hundred cars that are ordered is said to be responsible for the company's difficulty. It is said that the company has orders for about 700 cars, which it cannot fill and deliver from lack of parts. John E. Billheimer, Auditor of State, is president of the company.

The Cole Motor Car Company has leased the building at 820-822 East Washington street that has been occupied by the Reliable Auto Exchange. The building is 50 by 200 feet, three stories high and fireproof, and will be used by the Cole Company for painting and finishing.

The Reliance Motor Truck Company, of Owosso, Mich., has opened a sales branch here, taking temporary quarters with the Buick Motor Company in East New York.

The Wilcox-Clemens Auto Company has moved into new quarters at 19 W. Ohio street, in a building just completed. The company has the agencies for the Speedwell and Clark cars.

This city was a control last Tuesday for a "Roadability" run given from Terre Haute to Indianapolis and return, under the auspices of the Terre Haute Motor Club, the prize being a trophy offered by the Terre Haute *Tribune*. There were nineteen contestants, no attempt being made at speed, the plan being to finish closest to a secret schedule. One of the contestants was Paul Cox, a fourteen-year-old boy, who drove an Overland car. The distance was 144 miles for the round trip.

Club Will Improve Highways

NEBRASKA CITY, NEB., May 30—An automobile club was formed here last week, the object of which is to promote good roads. An effort will be made to secure every autoist.

Kingston Welcomes New Automobile Maker

KINGSTON, N Y., May 30—W. A. Wood Automobile Manufacturing Company, a new corporation of the State of New York, is about to enter the automobile manufacturing field for the manufacture of high-grade pleasure cars and trucks. They have purchased the Peckham Car & Truck Company's plant at Kingston, N. Y., comprising seven acres of ground, with five buildings fully equipped with machinery and power plant, the main building being 325 x 75. The plant is situated on the junction of the West Shore and Ulster railroads, and has three separate branch tracks entering the plant. Some changes of equipment will be made to adapt the plant to the special work in hand, and these are under way, and the plant will add its contribution to the production of cars for 1910. The production will be high-grade pleasure cars, 30 to 60 horsepower, in every style, with chain or shaft drive, and a 30 horsepower chassis for runabout or touring car or town car service. An important part of the production of the new plant will be the manufacture of high-grade commercial trucks, and for this purpose an arrangement has been made with the Commercial Cars, Limited, of England, manufacturers of the Commer truck, for the reproduction of this truck under the existing designs, with slight modifications, adapting it to American use. The sample new truck was received from the Custom House last Friday at 4.30, made its initial trip to Poughkeepsie that evening, arriving at 10.30, and in the morning proceeded to Kingston. The new model for the production of touring cars is also ready for duplication.

The city of Kingston gave the new industry a rousing reception at the Armory on Friday evening under the auspices of the Kingston Chamber of Commerce. The hall was filled with enthusiastic business men. An address of welcome was made by the Mayor of Kingston, followed by congratulatory responses from representatives of the city and of the new industry.

The project is regarded as something more than a mere civic gain to the community by the progressive citizens of the city.

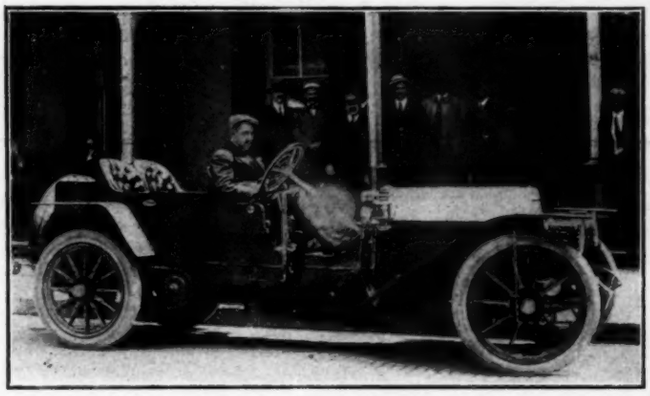


Fig. 1—The new automobile which brought about the demonstration and is the basis of manufacture

Fig. 2—The commercial truck which will have a place in the large new industry

Auto and Aero Club Elects Officers

MONTREAL, May 30—The annual meeting of the Automobile and Aero Club of Canada was held on Saturday and the following officers elected for the ensuing season: President, F. H. Anson; vice-president, L. C. Rivard; secretary-treasurer, G. A. McNamee; directors, J. A. Mackay, H. W. Pillow, C. F. Smith, Duncan McDonald, A. L. Caron, A. J. Dawes, Wm. Carruthers, and Eugene Tarte.

The question of establishing a country clubhouse was brought forward and a committee appointed to look into the matter.

Much has been accomplished in the matter of road improvement. The chief work of the club, the improvement of the International Highway between here and Rouse's Point will be continued this year. The distance is 50 miles. It is estimated that thousands of dollars are lost to the country each year through the bad road between St. John's and Rouse's Point, which prevents many automobilists from coming to Canada. The club hopes in time to persuade the government to establish a State road through this district.

Ground Broken for Velie Plant

MOLINE, ILL., May 30—Ground has been broken for the new plant of the Velie Engineering Company. The building will be located between Third and Fourth avenues and east of Twenty-fifth street. The present plans contemplate a building 600 feet long, 4 stories high and 80 feet in width. It will be of reinforced concrete similar to that occupied by the Velie Motor Vehicle Company. The new corporation has secured sufficient ground for four buildings of the size mentioned.

Publicity for New Association

Letters asking for financial support to the recently formed Association of Motor Car Manufacturers have been sent out pretty generally by the legal representatives of that body. The following is a copy of a circular letter signed by Henry C. Walter, Detroit, under date of May 19.

"In view of the fact that you were invited to attend meetings held in Detroit, for the purpose of taking steps looking to united action on the part of the independent manufacturers of automobiles, in combating the unfair methods of the A. L. A. M., you are informed that all plans were perfected on Monday last. Numerous counsel have been engaged, and action started along the general lines suggested in my previous communications.

"The companies that have been sued, most of which were represented, have decided to pay all the expenses of the present litigation.

"If those that have not yet been proceeded against care to contribute to a fund to be devoted solely to educational advertising, they may remit such amount as they desire to J. B. Chaddock, Treasurer Finance Committee, Association of Motor Car Manufacturers, Moffat Building, Detroit, Mich. Remittances may be made by companies that are not members of the association. From $250 to $500 from each company will be acceptable.

"I send you under separate cover a copy of a full-page newspaper advertisement now being run by the A. L. A. M., which should prove of interest to you.

"(Signed) HENRY C. WALTERS,
"Special Attorney, Association of Motor Car Manufacturers."

In the Realm of the Makers

R. H. Johnston has been appointed manager of the New York branch office of The White Company and will enter upon his new duties at once. Mr. Johnston has been advertising and publicity manager of the company since the early days of the industry and his numerous activities in that position have made him well known to the motoring public. Under the pen names of "Pathfinder" and "Pioneer" he has been a frequent contributor to the magazines on touring subjects. He has devoted much time to searching out and describing touring routes, and the information thus secured has been issued in the form of the White route books, which have proven exceedingly useful and popular.

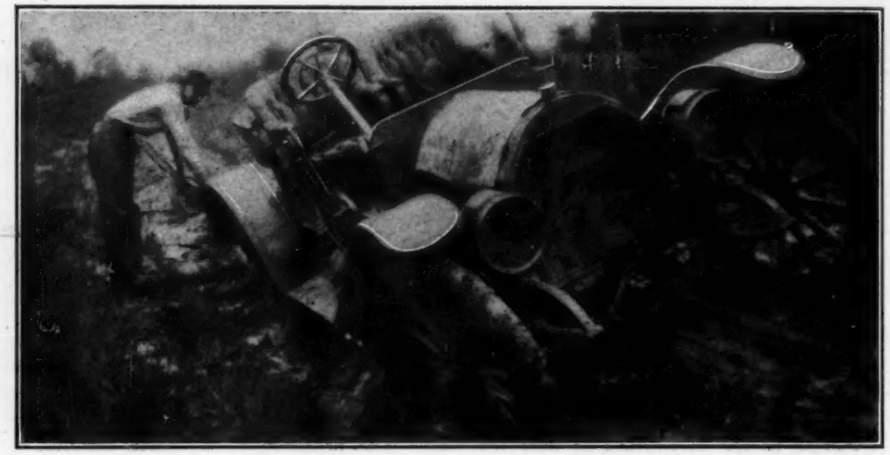
Mr. Johnston entered the services of The White Company in time to take part in the famous New York-Pittsburg endurance run of 1903 and he has been active in tours and public contests ever since that time, frequently serving as an official. He has also been an active factor in the cause of good roads and has been closely identified

R. H. Johnston, New York Manager of the White Company

with the movement of building a national highway between New York and Atlanta. He was one of the prime movers in the New York Motor Club, now defunct, and the entertainments which he organized and presided over have not yet been forgotten.

Two years ago Mr. Johnston brought a test case to determine the rights of non-resident motorists in the State of New Jersey. Although the Supreme Court of the State finally decided against him, the litigation served to emphasize the unjust provisions of the original Frelinghuysen law, and that law was thereupon amended and modified in several important particulars.

Mr. Johnston was born and bred in New York and thinks that Broadway is the garden spot of the universe. When he moved his office from New York to Cleveland last Fall there were many who predicted that he would soon return—a prediction which events have verified. There will be a host of friends to welcome him back.



Moon Automobiles Doing Missouri Roads

Among the Various Agencies

The Vale Automobile Company, of Beloit, Wis., is handling the Marion.

Rix & Company, of Calgary, B. C. are named as the Winton agents in that vicinity.

The Selden Automobile Company has opened a Pittsburgh agency at 320 Liberty avenue.

The American Garage in East Market street, Indianapolis, has taken the agency for the Royal Tourist.

Joseph Striker has just been added to the local sales force of the Buffalo agency of the Franklin Automobile Company.

The Ferromatic Tire Company, of Kansas City, Mo., has established its principal headquarters at Manitowoc, Wis.

The Southern Vehicle & Auto Company, of New Orleans, has taken the agency for the Lozier line of cars for that city and vicinity.

The Automobile Equipment Company has taken on the agency in Baltimore for the Kissel Kar. The firm is located at 2207 Madison avenue.

Barrett Bros., of Albany, Ore., have secured the agency for the Overland cars. White & Scheer have secured the agency for the Overland at Canby, Ore.

The Smith Auto Company, of Birmingham, Ala., has contracted for the Halladay line, manufactured by the Streator Motor Car Company, of Streator, Ill.

H. M. Meyer, Pittsburg, has been given the agency for the Automobile Air Shock Absorber in that city. Edgar A. Dossert, Philadelphia, has been appointed the agent for that vicinity.

The Mitchell-Lewis Motor Company, of Racine, Wis., has started construction work on a large warehouse of steel, concrete and brick. The building will be two stories high and will be used to store finished cars awaiting shipment.

D. D. Cummings, of Minneapolis, Minn., has opened a public garage in the Bailey building at Ashland, Wis.

The Sawyer Implement Company, of Sturgeon Bay, Wis., is equipping a part of its building into a garage, which will be in charge of Edward Hunt, an expert motor car mechanic.

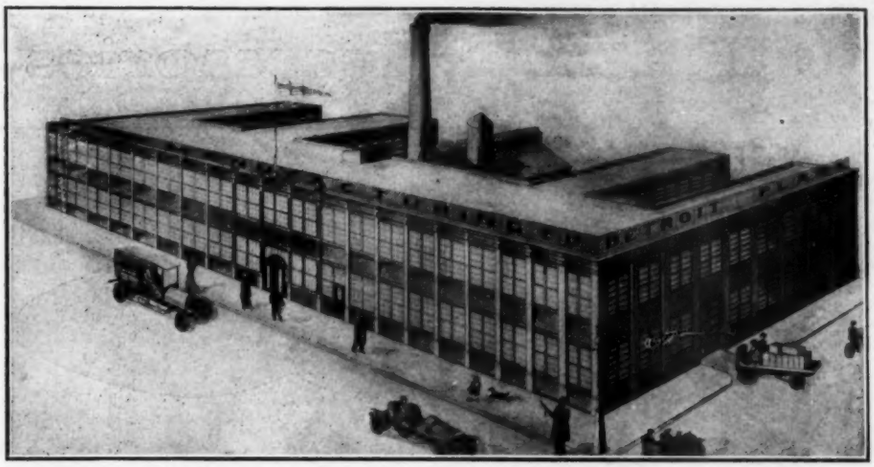
The Inter-State Automobile Company, of Muncie, Ind., is highly pleased with the showing of its Class B entry in the recent Harrisburg run. The car was awarded first prize in that class.

E. F. Short has opened an agency for the Inter-State in Indianapolis under the name of the Interstate Motor Sales Company and has located at Fort Wayne avenue and Tenth street.

The Findlay Motor Car Company, of Findlay, O., was this week incorporated by A. L. Welch, M. C. Mulball, Roy H. Hunter, J. C. Brooks and S. Gilfether. It will have a capital stock of $300,000. It is expected that the company will get under way shortly and push things to the limit.

The E-M-F Company is planning to establish a branch in Omaha for the E-M-F and Flanders cars. If this is done it is announced that a large new building will be erected here this Spring.

C. C. Hildebrand, Assistant General Manager of the Chalmers Motor Company



New Long Radiator Plant at Detroit, Mich.

Frank J. Flanigan has established a Simplex agency in Seattle. His agency contract covers the States of Washington and Oregon, and Seattle will be the distributing headquarters.

The Chittenden Motor Car Company has taken the Buffalo agency for the Lion motor cars. All business done in the handling of these cars will be under the name of the Lion Sales Company.

The Brooke Automobile Company, of Kansas City, has opened an agency in Omaha at 2318 Farnam street, under the management of Paul C. Gee. The company handles the Lexington car.

Charles W. Larson has purchased the garage at 524 West Main street, Waukesha, Wis., and will operate it under the name of Auto Supply Company. Mr. Larson has the agency for the Overland.

The Shaffer Manufacturing Company, agents for the Pullman car, will erect a new garage at 408 North Calvert street, Baltimore.

The Champion Company, a Boston concern engaged in the manufacture of spark plugs for automobiles, will remove to Toledo. The machinery for the company is expected to arrive in a week or ten days. The concern will supply spark plugs for the Willys-Overland Manufacturing Company.

Lee Counselman, Vice-President and General Manager of the Chalmers Motor Company

O. H. Hansen and Theodore Tellefson have leased the Scobie Building, at Cambridge, Wis., and will open a garage and salesroom for the Buick, Ford, Oakland, White and Oldsmobile.

Mortimer Reeves has been appointed contest manager of the United States Motor Company. Mr. Reeves is a brother of Alfred Reeves, general manager of the A. L. A. M.

H. E. Halbert, proprietor of the Garfield Park Automobile Garage, Chicago, denies the reports that have been circulated that he has sold the property or contemplates any change in its management.

The Streator Motor Car Company, of Streator, Ill., commenced the erection of two machine shops, each 75 by 400 feet. These buildings are to be of the latest mill construction, and machinery is already on the ground for equipping them throughout.

Hockaday Brothers have opened a motor supply house in temporary headquarters at Wichita, Kas., having disposed of their department of bicycles and sporting goods. L. C. Graham has been engaged as manager of the firm's auto accessories department.

The General Tire Company, of Cincinnati, was incorporated recently with an authorized capital of $10,000, to deal in automobile tires and accessories, with A. V. Boettles, J. H. Marvin, Phil Eid, A. J. Braumvart, Jr., and John L. Boake as incorporators.

The Michelin Company has discontinued the retail department of its tire agency in Buffalo, and attention will now be devoted exclusively to the wholesale trade. The retail business has been placed in the hands of the Chittenden Motor Car Company, located at 906 Main street, Buffalo.

General Trade News.

Owners of automobiles in Buffalo have been informed that the Board of Aldermen of Nunda, N. Y., has adopted a speed limit law. Vehicles are limited to 10 miles an hour through the village. Any violation will be punished by a fine of not less than $5 nor more than $50.

The Taxicab Co. of America has purchased the building formerly used by the Henkel livery, Detroit, and is equipping it as a garage. The Henkel barn recently was the scene of a dispersal sale of horses and cabs, the business being given up as no longer profitable, since the advent of the taxicabs.

E. B. Finch has resigned as manager of the technical department of the Chalmers Motor Company, to become Cleveland distributor of Chalmers cars. Last Monday his fellow employees and the company joined in giving him a farewell dinner, at which time he was presented with a fine shotgun as a testimonial.

J. B. Long, President of the Long Manufacturing Company

The Cole Motor Car Company, of Indianapolis, has reorganized the Chicago sales and distributing agency. G. W. Stephens and F. S. Cropley have formed a company to be territory distributors of the Cole 30, and will be temporarily located in the Standard Automobile Company. In the near future they will remove to much more commodious quarters.

Michelin Tires on Winners—In the equipment of the first, second, third and fourth cars to finish in the Wheeler and Schebler and Prest-o-Lite contests on the Indianapolis Speedway, were included Michelin tires. On the Marmon winner and the Jackson car which finished well up, no tire changes were required in the former event. On almost all the cars that won national championships in the Decoration Day events the Michelin tires were in evidence.

Prominent Automobile Accessories

ELECTRA SPARK PLUG

It may not be generally understood that the electromotive force, which is available from a magneto or a coil, is limited by the breakdown potential of the spark plug. If the spark plug will not stand up against the electromotive force of the magneto, it will be necessary to decrease the distance of the gap in the spark plug to protect the same, but it must not be forgotten that this very process is the one which limits the electromotive force of the magneto. It has not been difficult to design magnetos for high potentials; it is even possible to realize 30,000 volts, but it is quite another question to so design a spark plug as to be able to use these higher potential ways. The illustration here offered shows two types of the "Electra" spark plug, the one to the right being a modification of the standard form, somewhat lower in price, and is offered here for what it is worth. The section to the left is the standard form, in which A is the main insulator of porcelain, surrounding the electrode Q. B is the enlarged portion, which offers two abutting faces for the soft packing C1 and C2.

This packing is asbestos in character, enveloped in copper sheathing. D is a protecting insulator, also of porcelain, and the threaded portions E and F serve as the housing, F being reduced to the proper size for screwing into the cylinder. The terminal H offers a neat and substantial way out of the customary difficulty, and affords a substantial means of connecting the high potential leads to the spark plugs. This spark plug is used in France, and is about to be introduced to American autoists by M. Volpé, 136 Liberty street, New York. This type of spark plug is used in conjunction with magneto and other ignition work on divers of the better grades of foreign automobiles, and it is expected that it will prove of more than a little value on exacting American work of this character.

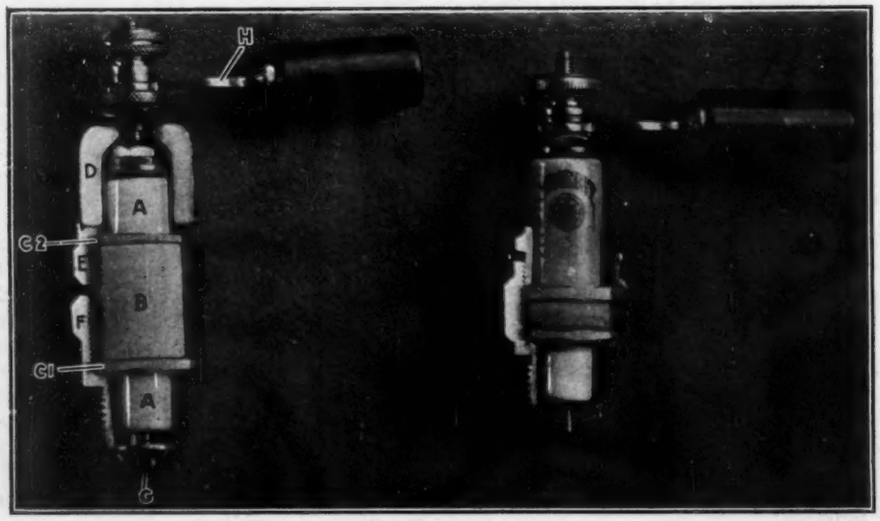


Fig. 1—Two Types of Electra Spark Plug—Section to Show Insulation

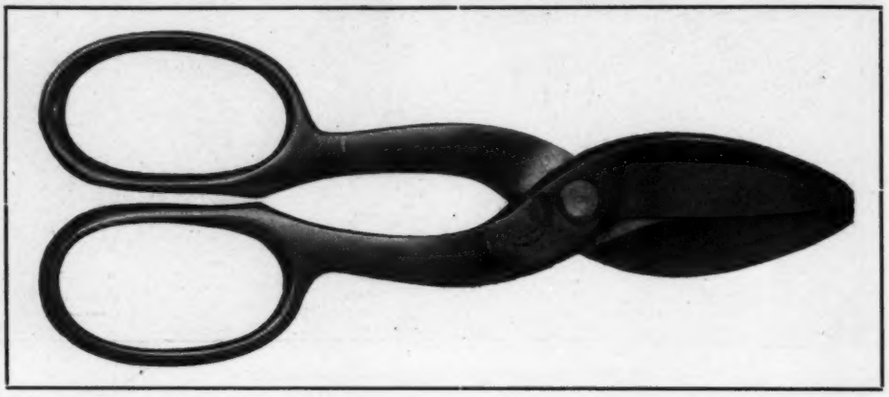


Fig. 2—Snips as used by autoists for various purposes; they are made in several sizes

SHEAR AND SNIP COMBINED

In an emergency while motoring, or, in fact, almost any time, the possession of a good strong, sharp pair of shears or snips is necessary. In case of repair work on the road the cutting of washers or gaskets on the spot may mean the saving of exasperating delay. In order to provide a thoroughly adequate tool of this description, the National Cutlery Company, of Philadelphia, has made a new type of snip which combines the principles of shears and is marketing the tool at $1.50.

The company says that the quality and finish are first rate and recommends the tool to automobile operators without hesitation. It is made with oval blades to facilitate cutting small circular washers and for performing many other kinds of emergency work.

Automobile Touring Tent—To enjoy an automobile tour through the wilder sections of the land, a good, waterproof tent of light weight and close woven texture, is about as important to the success of the trip as an adequate supply of food or gasoline. The New York Sporting Goods Company, realizing that self-evident fact, has

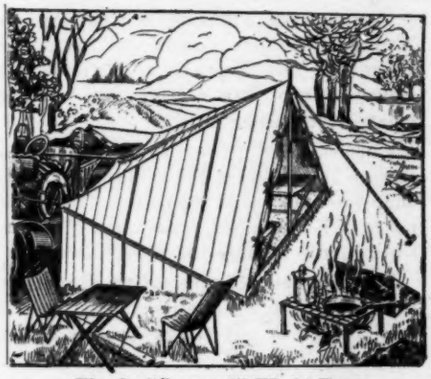


Fig. 3—"Compact" Khaki Tent

put on the market an automobile touring tent which is pronounced satisfactory in every way by the manufacturers.

It is made of khaki and is waterproofed after completion in other respects. It is reinforced with tape at the seams and is built to stand hard usage. The pole that is used with this tent is in three joints and the guy ropes are so arranged that they may be stayed either to the car or by tent pegs. The whole tent weighs only 31 pounds and can be folded into a package 36 by 7 inches, thus occupying only a small space in the car.

When the tent is raised it makes a room with nine feet frontage, seven feet high and deep, sufficient to accommodate three cots, or two cots and folding tables and chairs. Larger tents are not practicable for automobile tours, but if the party to be served is larger than four, two tents may be set facing one another.

The price of the outfit is $25, or the tent may be had separately for $16.